

The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XV: No. 10.

New York, Thursday, March 11, 1875.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Late E. B. Ward, of Detroit.

The portrait of the late Capt. E. B. Ward, which we this week present to our readers, will be recognized as one which presents the likeness and preserves the expression with a fidelity rarely attained in wood engraving. The delay in securing a satisfactory photograph, and the care with which we caused the engraving to be executed, have prevented our sooner giving it to the public.

Captain Ward was a man so well known to the American iron trade that no obituary notices are needed to commemorate his great enterprise or his great successes. Like most Western capitalists, he was pre-eminently a self-made man. In early life he abandoned farming, to which he was reared, and learned the printer's trade. Tiring of an occupation unsuited to his temperament, and affording so little opportunity for the exercise of his faculties, he became a sailor on the lakes, and subsequently acquired a knowledge of business as a clerk in a warehouse at Marine City (then called Newport), on the St. Clair River, about fifty miles from Detroit. From this position he advanced to the ownership and management of a line of steamboats. He thus laid the foundation of the fortune which he invested and greatly increased in iron manufacture.

Early in the opening of Western railroad routes he saw that iron mills would be needed, and about 1850 bought a large share of the Eureka Iron Company, a Detroit furnace enterprise, located ten miles below the city, where the thriving iron making town of Wyandotte now stands. Under his management the Eureka began to prosper. The Wyandotte Rolling Mill was built near it, and he thus became the pioneer in iron making beyond Ohio, his friends gravely fearing ruin to his interests from this venture. But the sagacious foresight, which was one of his remarkable qualities, proved wise in this as in most of his enterprises. The Wyandotte mills and furnaces now employ some 500 men, the making of boiler plates, chains and bars of Lake Superior iron, and of best quality, being a specialty, and the rail mill turning out some 15,000 tons a year. A few years later the North Chicago rolling mills and furnaces were started, and within the past four years five mills have been enlarged and improved, a Bessemer steel mill added, furnaces capable of smelting fifty tons of pigs a day built, and some 1600 men are employed there, with contracts for a full year to come. The Milwaukee Iron Company was next organized, furnaces like those at Chicago built, and a fine rail mill put in operation, where over 1000 men are employed, and work is engaged for months in advance. Capt. Ward owned a charcoal furnace at Leland, on the lake shore, in the forests of Northwestern Michigan, and the New England iron mine back of Marquette, on Lake Superior. The Chicago and Milwaukee companies, in which he was an active and leading owner and officer, also held a tract of over 1000 acres of red fossiliferous ore in Wisconsin, west of Milwaukee, on the railroad, using the hard ore for making rails with softer Lake Superior iron—one for the top and the other for the web and flange. He also owned iron banks in the Menominee district in Wisconsin, coal beds in Pennsylvania, and vessels for shipment of ore, coal and lumber, his steamboat interest being limited as he grew into the iron business. He owned \$1,500,000 of stock in Chicago, with \$500,000 in Milwaukee, \$400,000 in Wyandotte, and \$100,000 in Leland, counting all at par. These great enterprises will all miss the good judgment and clear foresight of Capt. Ward, but he has left them in good hands which will probably carry forward successfully what he so successfully began.

Mr. Ward had some 80,000 acres of valuable pine lands in Michigan, and large saw mills at Ludington, on the western terminus on the lake of the Flint and Pere Marquette Railway. Of that road he was president, and left it in best condition. He also had a large tract of timber land on the Maumee River, below Toledo, and had lately helped largely to organize and start the Crystal City Plate Glass Works, just below St. Louis, Mo. Probably no one man has done more to develop the industrial resources of the Northwest, and the place left vacant by his death will not soon be filled.

Personally, Capt. Ward was an affable and agreeable gentleman. Those who knew him liked or loved him according to the intimacy of their acquaintance with him. His liberality was large, his benevolence comprehensive, his charity unostentatious. He was a generous and untiring champion of the best interests of the laboring classes, and none have mourned him more truly than those who, in humble stations in life, were the beneficiaries of his favor or the recipients of his bounty.

The appearance of silver may be imparted to iron wire by a thin film of tin. The wire is first placed in hydrochloric acid, in which is suspended a piece of zinc. It is afterward placed in contact with a strip of zinc in a bath of two parts tartaric acid dissolved in 100 parts of

water, to which is added three parts of soda. The wire should remain about two hours in this bath and then be removed, and made bright for polishing or drawing through a polishing iron. By this galvanic method of tinning, wire which has been wound in a spiral, or iron of other shape, can be made quite white, which is an advantage over most other methods, where the wire is tinned in the fire and then drawn through a drawing plate. (Dr. Heeren's process.)

An English Iron Master on the Iron and Steel Industries of the United States.

We take the following from the London *Mining Journal*: Whilst the ironmasters of Great Britain are awaiting a complete report from Mr. I. L. Bell of his visit to the iron and steel works of America, the views of a Staffordshire ironmaster upon what he saw during

rolls in this country. That principle obviated the use of grooved rolls in the rolling of bars, and saved the great delay and cost entailed by the frequent changing of rolls. The purpose was attained by the use of small vertical as well as the usual horizontal rolls. Thus by the shifting of the vertical rolls so as to bring them closer together, or remove them further apart, bars of any required width, up in this case to 16 in., might be rolled with the same horizontal rolls. There were steam hammers in the same works, and slotting machines, together with rivet-making and other similar machines for completing small work. The proprietors went in for as great a variety of products with as small but as complete a plant as possible. Nor did they neglect their operatives. By the use of water, which constantly trickled upon plates of iron suspended in front of the furnace doors, the inside of the works became in hot weather cooler than the outside. Further, by the use

was pointed out that at Ironton, 10 miles from Niagara, two blast furnaces were in course of erection. The engine house of these furnaces, which could not be matched for style and spaciousness in England, Mr. Molineaux described as having the appearance of a mansion fit for the abode of a man with an income of from £1500 to £2000 a year. Four furnaces were ultimately to be put up here, the proprietors having bought no less than 300 acres of land for the purpose of their works. The engine house he had depicted was the home of two condensing engines, having 54 in. steam cylinders, 96 in. wind cylinders, and 7 ft. stroke. Twenty boilers, 55 ft. long and 3 ft. diameter, supplied the engines with steam; and there were eight or ten hot air ovens to each furnace, so arranged that any one could at any time be cut off for repairs without interfering with the working of the furnaces. Lake Superior ore for these furnaces was being unloaded on the ground from

two 8 in. wire mills. The most recently erected of these had been fitted up at great expense, the chocks being made of Bessemer steel (planed to fit); instead of liners for chocks, wedges were used, planed, fitted and screwed in in the nicest manner. Here, too, was a set of three-high 16 in. rolls for billeting down all their steel rail ends to a 2 in. by $\frac{1}{8}$ in. bar. In this shape the steel was charged into the mill furnace by a door at the back, and after being drawn out at the other side, was rolled into wire. Every pound of their Bessemer scrap they seemed to be using up in one way or another. The work had not been short of orders all the time Mr. Howell had been manager; and when, in the autumn of 1873, Mr. Molineaux was at the works, Mr. Howell said that they had orders on their books which would take them two years to execute.

At Chicago there were the North Branch Bessemer Works, having two blast furnaces; two forges, with three high forge rolls; two rotary squeezers; two three-high rail mills—one for iron and one steel; and everything as complete and efficient as possible, alike as to minimising labor and permitting no waste.

At St. Louis there was an iron works which had been laid down by an Englishman, which was as good nearly as it was 25 years ago, and this same Englishman, who went out from Cleveland—and in doing so, never, in Mr. Molineaux's opinion, made a greater mistake in his life—had designed no inconsiderable portion of the iron works machinery of the States.

Upon calling at Ohio Falls Iron Works, at New Albany, near Louisville, when his name was announced, the manager, who was an Englishman named Dangerfield, told him that he was at that moment reading an account in an American paper of a new furnace that he (Mr. Molineaux) had just put up at his works at Moxley. Now, that news from the date at which the fact was published in this country had traveled faster than he had himself, and he mentioned the fact to show how watchful an eye the American iron and steel masters were keeping upon what was being done in those industries in the old country.

Works at Cincinnati, at Youngstown, at Johnstown and elsewhere were described, and much significance attached to the Cambria Works, at Johnstown, with its four blast furnaces, its forty-six double puddling furnaces, and its admirable and extensive steel making and steel working appliances. Space will not, however, allow us to do more now than to add that, while Mr. Molineaux is profoundly impressed with the vast strides in iron and steel making and manipulating which the Americans have made in the past twenty-five years, still he does not despair of an excellent business being possible with them for a long time to come. They have, he says, much overdone the work of preparing to meet the American demand, and they have done this at a very heavy first cost. With moderate prices in England the British iron master, Mr. Molineaux believes, may safely calculate on keeping the United States as one of his customers. The two greater difficulties with which the iron and steel producer of America has to contend are dear labor, and, to some of the native markets, expensive land carriage. Illustrative of the cost of labor in the States, he pointed out that at the time the puddlers in this country were being paid the very high and unexampled figure of 12.6 per ton, puddlers in America were being paid nearly twice that sum; and he showed that a roller who had three hoop mills in his care was from that source netting £1000 a year, and was, moreover, the owner of a much used livery stable. Relative to the expense of carriage to some of the American markets, Mr. Molineaux does not think that it costs much, if any more, to carry iron from some of the British iron works across the Atlantic to New York than it does to take iron from Pittsburgh to that market.

A prohibitive tariff is what, in his opinion, English iron and steel masters have most to fear, but he does not believe in the probability of such a duty. He speaks most highly of the frankness with which American iron and steel makers everywhere, with one solitary exception, threw open to him the whole of their works. "We have, they said, no secrets, and we will give you any explanation you need." The exception was that of some steel works which certain manufacturers from Sheffield had started near Philadelphia. But even to those works he might, perhaps, have obtained admission if the proprietors had not been away. Specimens of the sheets, hoops and horse nails and the like, which he picked up at random in passing through the works, Mr. Molineaux showed to the Association, and they were pronounced of much excellence. As he deserved to be, the author was very warmly thanked for his excellent paper, which bristled with facts from beginning to end, and was in no respect discursive.

The Spearman Furnace, Pa., is now blowing out on account of the miners' strike. Of the nine furnaces in Sharpsville, every one is now out of blast, and bottom has been reached.



E. B. WARD.

a tour of the iron and steel making localities of the United States have just been made known in a communication of much merit made to the South Staffordshire Mill and Forge Managers' Association, Wolverhampton. The author of the paper was Mr. W. Molineaux, ironmaster, of Moxley, near Wolverhampton, who knew the United States iron trade as it existed a quarter of a century before. The progress that had been made in the interval, as well in the using up as in the making of iron and steel, greatly astonished him; nor was he scarcely less surprised at the handy, compact, and generally efficient class of the machinery employed both in the iron mills and the steel shops. Much of this machinery the British iron and steel master had not yet learnt to use in the way in which, with so much resulting economy, the Americans had learnt to use it. Nor had it yet been attempted by iron and steel makers in England to anything like the extent in which it was practiced in America to make a profit upon the utilizing of the iron and steel which they produced. The excellent forge and mill arrangements, and the manner in which the iron and steel made was turned out completed goods all at one establishment, he saw quickly upon landing, at the Passaic Rolling Mills, of Cooke Brothers, at Paterson, New Jersey, only 15 miles from New York. Here was in operation a three-high 16 in. forge train (of rolls), and a 16 in. universal mill at the end of the train. He did not know that in any forge train in England the three-high system of rolls were used, though three-high rolls were used—but not generally—in mills; and in only two or three instances was that which the Americans term the universal principle applied to

what the Americans termed "the telegraph," the incandescent iron was conveyed from the furnaces to the hammers, and from the hammers to the rolls, suspended in the air, and there was little or no use, therefore, for that other source of heat in the works—floor plates of iron. Close by Mr. Molineaux saw what in England was termed a drawing-out forge, where iron and steel of all kinds and sizes was being drawn out and turned, for cast steel in pots was also made in the place, in eight furnaces, producing three heats per day. Whilst he was in the forge a 10 ton crank was in the lathe, and a fine forging, exceedingly well finished, it was. Connecting rods, piston rods &c., were also being there produced. Likewise at Paterson he visited the three locomotive and engineering works, employing together 3000 hands, making locomotives as good as any he had ever seen, and supplying the machinery required by 20 cotton and silk mills in the same town, as well as producing other first-class machinery.

At Albany there were two new blast furnaces at work, producing 420 tons per week, and two more were being erected. Better furnaces he had not seen even in the North of England.

Rolling mills and forges were also to be laid down by the proprietors of the furnaces, who had taken some 15 or 20 acres of land for the purpose. The property was connected with the Hudson River and with the Erie Railway. A spacious three storied building at Albany had been taken by a company for making agricultural machines.

Troy, with its Bessemer plant; Syracuse, with its works for making spring steel; and then Rochester, were passed in review; and it

Trenton Vise & Tool Works,

TRENTON, N. J.

Manufacturers of

Solid Box Vises,
HAMMERS, SLEDGES, PICKS,
MATTOCKS, GRUB HOES, ETC.

WAREHOUSE 101 and 103 Duane Street, N. Y.

HERMANN BOKER & CO.

Our Vises are warranted to do more work than any other make. No broken boxes or screws.



THE CHICAGO TEA KETTLE SPOUT.

This article fully supplies a want long felt; is stamped from one piece of IX plate, and the side flanges are folded ready to lock into the body of the kettle, thus forming an integral part thereof. It is double-seamed to the bottom, as the rest of the body is, and soldered at top to the edge of the breast. After the Spout is stamped, and the upper flanges locked together, the whole is *immersed in Molten Tin*, and completely recoated, making a *perfect article*. It makes the strongest Spout yet produced, and entirely obviates the objection to all other similar articles, viz: leaking at the line of union with the body. It is rapidly *superseding all others*. Ask your Timers' Stock Dealers for it.

No. 50, (for 5 inch high of body) \$0.67c
" 60, " 6 " " " 75c
" 70, " 6 1/2 " " 80c

Made only by

Frank Sturges & Co.,
Manufacturers of TINNED, STAMPED AND JAPANNED WARE,
72, 74 and 76 Lake Street, Chicago.



SILVER MEDAL.

This compound is manufactured under the inventor's personal supervision, and is sold and warranted genuine under the above trade mark, in 1, 5, 10, 50 and 100 lb. packages. Price for 1 lb., 40 cents; for 5 and 10 lb. packages, 30 cents per lb.; for 50 and 100 lb. packages, 25 cents per lb. Samples sent on order. Pound packages can be had at all the principal hardware dealers in the United States and Canada.

The advertiser respectfully refers to the following establishments in which his welding compound is exclusively used: TROWELIER & CO., New York; NEW YORK TRENTO VISE & TOOL WORKS, Trenton, N. J.; H. H. CO., Newark, N. J.; NEWARK TIN WORKS, Newark, N. J.; J. C. CURRIER & CO., Engine Builders, Newark, N. J.; JERSEY CITY STEEL WORKS, J. R. THOMPSON & CO., Jersey City, N. J.; GRANT LOCOMOTIVE WORKS, Paterson, N. J.; DELAMATER IRON WORKS, N. Y.; D. G. GAUTIER & CO., Jersey City, N. J.; JAMES MOORE, Bush Hill Iron Works, Philadelphia, Pa.; THE CRANE IRON WORKS, Catskill, Pa.; S. S. POLLARD, 141 Raymond Street, Brooklyn, N. Y.; W. H. WORTHEN, Supt. Morris Co. Iron and Machine Co., Dover, N. J.; and J. L. H. MOSIER, with Brewster & Co., of Broome Street, New York. UNION IRON CO., Buffalo, N. Y.

H. SCHIERLOH,

24 Exchange Place, Jersey City, N. J.

AGENTS:

WYETH & BRO., Baltimore, Md.

PANCOAST & MAULE, Philadelphia, Pa.

CYRUS CURRIER, Newark, N. J.

R. POTT, 130 Smithfield St., Pittsburgh, Pa.

W. W. KER, 59 Dearborn St., Chicago, Ills.

H. C. JENKINS, Union Iron Co., Buffalo, N. Y.

F. A. & A. M. SMALL & CO., Boston, Mass.

CONGDON, CARPENTER & CO., Providence, R. I.

H. R. IVES & CO., Montreal.

O. LINDEMANN & CO.,

Manufacturers of

JAPANNED AND PATENT BRIGHT METAL

Bird Cages.

Dates of our Patents:

September 2d, 1861.
October 4th, 1870.
August 29th, 1871.
November 7th, 1871.
January 2d, 1872.

March 12th, 1872.
February 4th, 1873.
November 17th, 1874.
December 8th, 1874.
Re-issue, October 29th, 1874.

Office and Salesroom,

No. 254 Pearl Street.

Factory,

Nos. 252, 254 & 256 Pearl Street.

NEW YORK.



FORTY-SECOND YEAR.



Goods stamped "D. R. Barton & Co." are NOT made by me.
For GENUINE "D. R. Barton" Edge Tools, Planes, Axes, &c.,
be sure to address D. R. BARTON, and NOT D. R. Barton & Co.

Factory and Office Mill Street, cor. of Furnace.

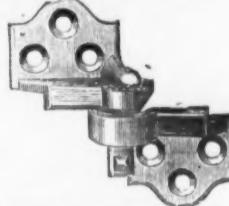
D. R. BARTON, Rochester, N. Y.

Buffalo Hardware Co.,

Manufacturers of

GARRETSON'S

PATENT BLIND AND GATE HINGES, AXLE PULLEYS, &c., &c.



OFFICE AND WORKS,
Cor. Terrace and Henry Streets,
BUFFALO, N. Y.

Send for our Illustrated Catalogue.

Spelter.

Though known as early as the beginning of the sixteenth century, when Paracelsus noticed it under the name of zincum, the numerous and important applications of zinc, or spelter, are for the most part of very recent date. Its distinguishing characteristics are a bluish-white color and lustre; specific gravity, 7; at common temperatures tough and intractable, but heated to between 220° and 320° Fahr., it becomes malleable and ductile, so that it may be hammered out, rolled into sheets, and even drawn into wire of such tenacity that one-tenth of an inch in diameter is capable of sustaining a weight of 36 pounds. Heated beyond that point—say to between 400° and 500° Fahr.—it again becomes so brittle that it may be reduced to powder in a mortar. It melts at 700°; and heated beyond this it takes fire in the open air, and burns with a brilliant bluish flame. The metal is obtained from two ores, namely, calamine, a native carbonate, and blende, a native sulphure. These ores occur in two geological positions, namely, either in the carboniferous or in the magnesian limestone, associated with galena, and sometimes with the ores of cadmium.

Spelter fit for rolling is smelted chiefly from the ore called calamine, the largest mines of which are in Prussia (Silesia), and in Poland, but there are also deposits in Italy, Spain, other parts of Europe, and on the western slopes of the Rocky Mountains as well as other localities in the West.

The calamine, when taken from the mine is broken into small pieces, and freed by hand as much as possible from foreign matter; it is next deprived of its carbon by calcining it at a red heat in a reverberating furnace, after which it is washed to get rid of the lighter earthy parts. The metallic oxide is then dried, and about 12 per cent. of charcoal is mixed with it by grinding it; it is then ready for the smelting furnace, in which are a number of earthen pots and crucibles. Into the bottom of each pot an iron tube is fixed, the upper orifice of which is nearly at the top of the interior, and the lower aperture terminates just above a vessel containing water; these vessels are fitted up to a level with the tubes with the prepared ore and charcoal. The covers of the crucibles are then hermetically fastened on, the fuel of the furnace ignited, and an intense heat maintained for several hours. As the metal is reduced it ascends to the top of the crucible as vapor, which, being unable to escape, is forced down the central iron tube, and passing into the water is condensed into small globules, completing the process known as "distillation by descent." The globules are afterward melted and cast into cakes, weighing generally from thirty to forty pounds, in which state they are sent to market.

The principal zinc rolling mill in England is the London Zinc Mill; in Prussia, the Silesian Company; in Belgium, the Vieille Montagne Company, while there are several smaller ones in the United States, principally in our immediate neighborhood. The very great expense of erecting the necessary machinery for zinc rolling makes the business, virtually, the monopoly of a few.

Its sulphate and oxide are employed in medicine and the manufacture of zinc white. With copper, zinc forms the well-known alloy, brass. White vitriol, or vitriol of zinc, hastens the drying process of varnishes. Though the action of water upon zinc is scarcely appreciable after it has once been coated with the oxide, yet the addition of a little acid (as sulphuric) dissolves and removes this coating, and further oxidation proceeds with rapidity. It is this action which renders zinc so powerful a generator of electricity in the voltaic pile or battery.

We have on various occasions, for a year past, alluded to the increasing consumption of Spelter in Europe, and the last mail furnishes us some details on the subject.

The present demand in France and Belgium, in connection both with useful and decorative architecture, seems to be very great, and although not to the same degree as on the Continent, it is being brought into use for the same purposes in England, more especially in London. After spelter has been rolled it is used for many purposes for which tin, copper and lead are used, for which metals it is largely becoming substituted. It is thus supplanting tiles and slates for roofing, apart from its uses in the interior of buildings. It possesses great durability, so that, when laid of sufficient thickness, it will serve for 30 years without requiring repair, and then be worth from one-half to two-thirds the value of the metal.

Its chief superiority over lead is the peculiarity that the atmosphere only affects it superficially, forming an oxide on its surface which does not scale off, is impervious to rain, and acts as a coating to preserve the body of the metal, and under a hot sun, as in Australia and other warm countries, where it is now used for roofing, it is well known that it cools sooner than any other metal. Tin is not only less durable for such purposes than zinc, but much more costly.

Spelter, there is reason to believe, was used in Asiatic countries long before it became known to Europeans. The Chinese use it in large quantities for their inferior coinage. The natives of India use it for the manufacture of idols, charms, spells, and a great variety of native offerings to idols.

As it is, the consumption of this useful metal, whose production from native ores is rapidly increasing among us, seems to have no limit to it the world over, as long as it remains as cheap as it is at present, and therefore deserves all the more attention at our hands from now forward, especially as it partially replaces tin plates, an imported article.

Coal in Bermuda.—The *Times of India* states that Dr. Williams has discovered some valuable coal mines in the territory of the King

of Burmah, and His Majesty is about to have a railway constructed from them to his capital.

History of a Trade Union.

A direct outgrowth of this business has been the organization of a trade union known as the order of the Knights of St. Crispin. The order of Crispins was first established in Glasgow, Scotland, early in the present century, and its original purpose was not antagonistic to capital, but was to mutually protect the craft, employer and employee. The first Crispin lodge in this country was established in 1866, by one Miller, of Syracuse, N. Y. Its claims to the recognition of the journeymen boot and shoe makers were, that it would tend to break up strikes, to enforce a sound business basis, and curtail the surplus of labor by not allowing persons to apply for or to undertake first-class work until they had first served an apprenticeship. The order, at first, met with universal favor, and lodges rapidly sprung up all over the country, the first to be organized in this vicinity being at the Brookfields. The largest lodge in this State was the Harmony, at Lynn, which had, at one time, a membership of 1400. The order flourished finely for a time, the feeling between the manufacturers and laborers being the best, but the order contained refractory spirits, who took every possible opportunity of claiming grievances, and strikes and other disturbances followed, the first principles of the order being utterly ignored.

It will be remembered that it was the unjust exactions of this trades union which, in the summer of 1870, led Calvin T. Sampson, the North Adams shoe manufacturer, to undertake the bold experiment of introducing Chinese labor into his factory. Two years previous to this he had met his first experience of Crispin insolence and dictation in the shape of a peremptory demand from his employees that he discharge a journeyman who did not belong to the union. Things went on from bad to worse, until the April of 1870, when his help refused to submit to a reduction of 10 per cent. in their wages. Mr. Sampson allowed them to work out the orders then on hand, meanwhile endeavoring to obtain new hands. Several workmen, all Crispins, came from North Brookfield, but were scared or coaxed by their brother Crispins to return again. Now, having, as he claimed, had but little voice in his business for some months, owing to the officiousness of the Crispins, he decided no longer to endure their insolence, and four hours after the North Brookfield Crispins had departed an agent sent by him was on his way to San Francisco. The result of his mission is already known. The Orientals have worked faithfully and satisfactorily, and Mr. Sampson, beside putting himself in a position to run his own business once more, has had the satisfaction of knowing that at his hands the order of the Knights of St. Crispin virtually received its death blow.

It is claimed by the better class of Crispins that a majority of their troubles were caused by the foreign element, led on by a few hot-heads, who were the discredit to the order. The grand lodge of the State was also instrumental in its disgrace and downfall, as it fully justified the workmen in throwing up their kits on very slight provocation, while the various subordinate lodges of the State were obliged to contribute to the support of the idle workmen. In 1870 the order was granted a charter by the Legislature, which, however, was the work of demagogues and not especially beneficial to the order. Within two years thereafter every lodge in New England disbanded, and the order, if at present existing at all in this country, is confined to the West. Many strikes occurred during the existence of the order in this State, and in several cases force was used, although in strict opposition to the rules of the lodges.—*Springfield Republican*.

The Manufacture of Malleable and Gray Iron Castings at Phillipsburg, N. J.

The Vulcan Iron Works, of Messrs. Drinker & Weaver, at Phillipsburg, N. J., was established a few years ago, under the style of Protz & Co., the firm consisting of John Protz, F. F. Drinker and C. Weaver. The proprietors worked with their own hands, and did all the work, with the assistance of one boy, realizing for their products during the first year only about \$1000. Paying particular attention to the quality of their work, they soon established a reputation and secured a large and steadily growing trade.

In 1873, when the works came to be of considerable size, the establishment was named the Vulcan Iron Works. In 1874 Mr. Protz retired, leaving the business in charge of Messrs. Drinker & Weaver, who are now the sole proprietors. The buildings now occupied consist of a main office, 30x60 feet in size, and three stories high. The lower floor of this is used as a machine shop, which is equipped with lathes, drills, planes, and all the labor-saving devices of a first-class shop for the manufacture and repair of machines of every description.

The second floor is the pattern room, and the third a store room for patterns, where there is a large and valuable stock—the accumulation of several years. There is also, in the rear of this building, a separate building for the storage of patterns. This is 15x30 feet in size. In the rear of this is the foundry, 30x75 feet in area, where all kinds of gray iron and malleable castings are made, as well as brass castings of every description. The articles turned out range in weight from one ounce to 4000 pounds each. The productions embrace harness, hardware of all kinds, and an almost innumerable variety of small and large articles in brass and iron. Their annealing furnace is of very large capacity, the building being 15x40 feet.

Another important branch of the business is the manufacture of steam engines and machinery, and of ornamental railing for areas, doors, yards, cemetery lots, and castings for the tops of churches and buildings of all kinds. These railings are of a great variety of styles, of both cast and wrought iron, and they are distinguished for their beauty and elegance, as well as strength. A large business is done in these articles.

WARRANTED

EDGE TOOLS.

47 Murray Street, N. Y.

Manufacturers of Richards' Patent

Porcelain-head Picture Nails; also, Porcelain Picture, Drawer, Shutter, and Door Knobs, etc., etc.

Importers of German Brass Goods, also, China, Gilt, Steel, and Silvered Furniture Nails. Wire Nails, etc., etc.

We particularly invite the attention of large buyers to our Patent Picture Nails and Knobs being a specialty with us, we offer satisfactory discounts on good orders.

Patented Dec. 31, 1868.
Released May 1869.

THE RICHARDS
Hardware Co.,
47 Murray Street, N. Y.

Iron.
PHILADELPHIA.

Iron and Steel T and Street Rails
Of Best American and English Makes.
CHAIRS, SPIKES, FISH BARS, RAILROAD SUPPLIES.

Muck Bars, OLD RAILS, Scrap, BLOOMS.

American and Scotch
PIG IRON, AND METALS.

CHAS. W. MATTHEWS,
133 Walnut St., Phila.

(Late RALSTON & MATTHEWS, 133 Walnut St.)

MALIN BROS., IRON

Commission Merchants,
No. 228 Dock Street,
3d door below Walnut, PHILADELPHIA.

H. L. GREGG & CO.,
Ship Brokers & Commission Merchants,
Importers of

Old Iron, Metals and Rags.

Freight engagements made to all parts of the world.
Marine insurance effected in reliable offices.

108 Walnut St., Phila.

JUSTICE COX, Jr. & CO.,
Iron Commission Merchants,
Foundry and Forge Pig Iron,
New and Old Rails, Muck
Bar, Scrap, &c.

No. 333 Walnut Street, PHILADELPHIA.

THE CAMBRIA IRON WORKS,

Situated on the line of the Pennsylvania Rail Road,
at the western base of the Alleghany Mountains, are
the largest of their class in the United States, and
are now prepared to make

1800 TONS PER WEEK,

Of Iron and Steel Railway Bars.

The Company possesses inexhaustible mines of
Coal and Ore, of suitable varieties for the production
of Iron and Steel Rails of

BEST QUALITY.

Their location, coupled with every known im-
provement in machinery and process of manufacture
enabled them to offer Rail, where quality is con-
sidered, at lowest market rates.

The long experience of the present Managers,
of the Company, and the enviable reputation
they have established for "CAMBRIA RAILS,"
are deemed a sufficient guarantee that purchasers can,
at all times depend upon receiving rails unsurpassed
for strength and wear by any others of American or
foreign make. And that the usual patterns of rail-
can be supplied on short notice, and new patterns of
desirable weight or design will be made to order
Address,

CAMBRIA IRON COMPANY

218 S. Fourth St., PHILADELPHIA.
or at the works, JOHNSTOWN, PA.

W. GRAHAM HOOPES
Commission Merchant
FOR THE SALE OF

Pig, Bloom, Plate, Bar & Railroad IRON,

No. 419 Walnut Street, Philadelphia.

The Phoenix Iron Co.,
410 Walnut St., Philadelphia.

MANUFACTURERS OF

CURVED, STRAIGHT AND HIPPED

Wrought Iron Roof Trusses
BEAMS, GIRDERS, AND JOISTS,
and all kinds of Iron Framing used in the construction
of Iron Proof Buildings.

Deck Beams, Channel, Angle
and T Bars

curved to template, largely used in the construction of
Iron Vessels.

**Pat. Wrought Iron Columns, Weldless
Eye Bars,**
for Top and Bottom Chords of Bridges.

**Railroad Iron, Street Rails, Rail Joints and
Wrought Iron Chairs.**

Refined Bar, Shafting, and every variety of
Shape Iron made to order.

Plans and Specifications furnished. Address
SAMUEL J. REEVES Vice Pres.

J. O. RICHARDSON,
**Pig and Railroad Iron,
AND IRON ORES.**

No. 329 Walnut St., PHILADELPHIA.

Bonnell, Botsford & Co.,

Iron, Nails & Spikes.

YOUNGSTOWN, OHIO.

Iron.

PHILADELPHIA.

J. J. MOHR, IRON
Commission Merchant,
430 Walnut St., Philadelphia.
Sole Agent for

BUSHONG, SHERIDAN,
And other brands of **PIG IRON.**

Warren Spike Works.

G. W. FAHRION,
Manufacturer of

Railroad, Ship and Boat

SPIKES,

All Shapes and Sizes, Black
and Galvanized.

Warren, Ohio.

Chas. E. Spooner. J. B. Collins.
Spooner & Collins,
COMMISSION AGENTS,

PIG IRON
Blooms, Bar, Sheet & Hoop Iron.

100 N. Third St., (Room No. 6), St. Louis.

Warren Boiler Works,

Phillipsburg, N. J.

Steam Boilers,

Tanks,

Heaters,

Stacks, Pipe,

And all Wrought Iron work made to order.

ESTIMATES GIVEN ON CONTRACT WORK FOR FURNACES AND ROLLING MILLS.

A Liberal Discount on Boilers to Engine Builders.

Prices given on application. Address,

TIPPETT & WOOD.

Jewett's Patent

Filter

WITH

PORCELAIN LINED

COOLER.

Acknowledged the only
Complete Filter and Cooler
in the world.

Hardware, House-furnishing and Crockery dealers
can find no more salable article, as this Filter is per-
fect in its work of purifying water of every kind, at-
tractive in appearance, &c., &c. Send for illustrated
circular. Manufactured only by

JOHN C. JEWETT & SONS, Buffalo, N. Y.
Branch Office & Warehouses, 33 Murray St., N. Y.

OFFICES FOR PROCURING

UNITED STATES AND FOREIGN
PATENTS,

Forrest Builders

119 SOUTH FOURTH ST., PHILADELPHIA,
AND MARBLE BUILDINGS

605 Seventh St. Opposite U. S. Patent Office,
Washington, D. C.

H. HOWSON,
Solicitor of Patents. O. HOWSON
Attorney Law.
Communications should be addressed to the
PRINCIPAL OFFICE, PHILADELPHIA.

SOLICITORS OF

PATENTS

37 PARK ROW, N. Y. CITY.

Established 1851. Send for Circular.

TUCKER'S

Alarm Tills.

TUCKER'S
ALARM TILL
FOR SALE HERE

The above case without the drawer attached, sup-
plied with first order, gratis, for Sample Room.

TUCKER & DORSEY, Manufacturers

Indianapolis, Ind.

Hammered Work in Sheet Metal.

BY OLIVER BYRNE.

(Concluded.)

Fig. 12 represents the first stage of making the half of a copper ball; the metal is first driven with a mallet into a concave bed, generally of wood, in which it is hastily gathered up, as a sweep of about the third part of a sphere, as *a a*, Fig. 13; but this puckers up the edge like a piece of fluted silk, or the serpentine margin of many shells, in the manner represented at *ff*, Fig. 14, which is of twice the size of Fig. 13.

The next step is to remove the flutes or puckers by means of blows of the raising hammer, applied externally as indicated by the black lines at *h*, Fig. 14; and in Fig. 15 are represented, on a still more enlarged scale, the relative positions of the hammer, anvil and work. Thus *A* represents the globular face of the anvil, *B* the rounded edge of the raising hammer, which, like the pane of an ordinary hammer, stands at right angles to the handle, and *a* shows the work, *a* being the edge and *l* the point of the flute. The blows of the hammer are made to fall nearly on the center *o* of the

edge. Now, the artifice consists in making the intervals, both of the great sweeps *a b c*, Fig. 13, and of the little waves *1 2 3*, of Fig. 16, as large as practicable, provided they do not cause the exterior metal to pucker or become in plats, as this would endanger its ultimately cracking at those places where the metal might have become plaited.

In thus *raising* in the metal, it necessarily becomes thickened from its contraction in diameter, but as in Fig. 15 the hammer at *h* gives a hollow blow and bends, whilst the part *g* gives a solid blow and tapers, the two effects are thus combined; and when they are duly proportioned by a hammer more or less round, and blows more or less oblique, the true thickness, as well as the desired change of figure, are both obtained.

It is easier to get the hemisphere by a little excess of thinning, or by a superfluity of blows;

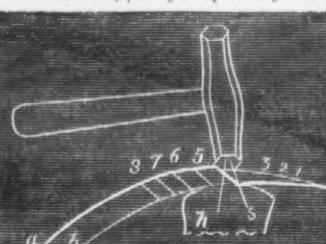


Fig. 12.

Fig. 13.

so that the less skillful workman will use a piece of copper of 7 inches diameter, with additional blows, for a 6 inch hemisphere; but the more skillful will take a piece of 7½ inches diameter, and obtain the work with less labor. Occasionally, when the work is common and thin, from three to six hemispheres or other pieces are hollowed together, the outer piece is cut as a hexagon or octagon, and its angles are bent over to embrace the inner pieces, before the process of hollowing is begun, and which scarcely consumes more time than for one only. This is a general practice in hollowing tin work, such as the covers of sauce-pans, as the number of thicknesses divide the strength of the blows; the several pieces are then twisted round at intervals, so as to arrange them in a different order, which mixes the little imperfections, and tends to their mutual correction. The raising process, represented in Fig. 16, is also performed upon two or three pieces at a

time when they are sufficiently thin to permit it. One of the most conspicuous and remarkable examples of raised works is the ball and cross of St. Paul's Cathedral, London. The old ball consisted of 16 pieces riveted together; the present, also 6 feet in diameter and one-eighth inch thick, was raised in two pieces only, and may, therefore, be considered to mark the improvement in the copper smiths' art in making large works, such as sugar-pans, stins, etc.

If, however, the puckers of a large globe were entirely removed by hollow blows, the central lines of the flutes would become thickened, and therefore solid blows are mingled with them, or rather the one blow partakes of the two natures. Thus, from the curvature and oblique position of the hammer, Fig. 15, its face is solid at *s*, to that part immediately below it, but toward *h* it rather bends than thins; the flatter the curves of the two surfaces, the greater the extent of the solid or thinning blows. The plats are not, however, entirely

gathered up, as the dish *a a*, Fig. 13, always opens a little, from the metal becoming stretched under the treatment for removing the flutes. Throwing the works into flutes, as described, is not imperative, for the hemisphere might be entirely raised, as in the succeeding step, by blows on the outer surface upon a convex tool, or head, but the flutes quicken the process, and speedily give a concavity which is convenient, as it makes the work hang better on the rounded face of the anvil.

The outer curve *a a*, Fig. 13, which represents the copper dish when the puckers have been removed, will not be sent into the hemispherical form, or the inner line *d d*, at one process, but will progressively assume the curvatures *b b*, *c c*, and sometimes many others. Neither will the work be changed from the curve *a a*, to that of *b b* at one sweep, or, as with the turner in spinning, even by one consecutive ring, or wave. The hammer must necessarily operate by successive blows arranged in circles, the proximity of which circles will at length include within their range the entire sweep *a a*, or *b b*, each of which is called a *course*; and before proceeding from one course, or sweep, to the next, the metal requires to be annealed.

Figs 15 and 16 explain the transition, or conversion, from the first sweep *a*, to the second sweep, *b*. The black lines represent the metal after a circle of blows have been given. Fig. 17

shows the narrow edge of the raising hammer in the act of descending upon the center of the head, or stake, and as a tangent to the circle. It first throws in a little rim at *l*, which connects the new and old sweeps by a curve, or ogee; then another little circle, *2*, will be similarly gathered in; then *3*, *4*, *5*, and so on, up to the

edge. Now, the artifice consists in making the intervals, both of the great sweeps *a b c*, Fig. 13, and of the little waves *1 2 3*, of Fig. 16, as large as practicable, provided they do not cause the exterior metal to pucker or become in plats, as this would endanger its ultimately cracking at those places where the metal might have become plaited.

In thus *raising* in the metal, it necessarily becomes thickened from its contraction in diameter,

but hammer, although such forms, and others far more difficult, could be raised entirely by the hammer from a flat piece of metal.

Should any of the above vessels require a solid thickened edge or lip, beyond that which would result from the drawing in of the metal, it would be necessary to select a piece of metal of smaller diameter but thicker, and to retain the margin of the full thickness by directing all the blows within the same; sometimes, on the other hand, works require to be thinned on the edge; these are then cut out proportionally smaller than their intended sizes.

In cases of extensive repetition, or where large numbers of any specific shape are required, expensive dies of the exact forms are employed; but these are only applicable to objects in small relief, and to those in which the parts are not quite perpendicular.

Stamping is very common for many works in brass, but which would be inapplicable if the pieces had perpendicular and lofty sides. Such lines, although rounded by the successive thicknesses of metal, would still present perpendicular sides, and therefore render this mode of treatment with dies impracticable, without reference to cost. Thimbles are raised at five or six blows, between as many pairs of conical dies successfully higher, but the metal requires to be annealed every time.

North Georgia Iron Ore.

A correspondent writing from Cartersville, Georgia, to the Cincinnati *Gazette*, says:

From Ringgold to Cartersville, about seventy miles, on both east and west of the railroad, but chiefly west, and ranging from two to twenty miles from its line, are hundreds of beds of iron ore (brown hematite) of great purity and richness, some immense hills or small mountains containing millions on millions of tons. It is these beds of ore which must make this region in the future one of great wealth and prosperity, coupled as they are with an excellent soil and good timber, and will be with easy transportation.

The question has arisen, Will it pay to ship these ores North? In 1873 the experiment was tried from Alabama and proved a financial loss. A Pittsburgh ore man lately traveling through this region has given a solution of

Iron.

CLEVELAND.

CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

BESSEMER STEEL RAILS,
Steel Plates and Forgings, Railroad Iron, Merchant Bar,
Beams, Girders, Splices, Bolts, Spikes, &c., &c.
Office, Nos. 99 and 101 Water St., CLEVELAND, O.

A. B. STONE, Pres. H. CHISHOLM, V. P. & Gen. Mgr.

E. S. PAGE, Secy.

Cleveland, Brown & Co.

IMPORTERS, MANUFACTURERS AND DEALERS IN

IRON AND STEEL,

HORSE SHOES, HORSE NAILS,

NORWAY NAIL RODS,

NAILS, SPIKES,

'Standard Taper' Axles & Wedges Iron,

WINDOW GLASS,

Wrought Iron Pipe and Boiler Tubes.

Chains, Rivers, Nuts, Washers, and Heavy
Hardware Generally.25, 27, 29 & 31 Merwin Street,
CLEVELAND, OHIO.

OLD DOMINION

Iron and Nail Works Company,

RICHMOND, VA.,

R. E. BLANKENSHIP Commercial Agent,

Manufacture

NAILS AND BAR IRON,

Bands, Scrolls, Horse Shoe Bars, Nut and
Rivet Iron, Spike Rods, Shunting, Bridge
Bolts, Ovals, Half Ovals, Half Rounds, &c.

The Iron-Masters' Laboratory.

Exclusively for the Analysis of Ores of Iron,
Pig and Manufactured Iron, Steels, Limestone,
Clays, Slags & Coal for Practical Metal-
lurgical Purposes.

No. 339 Walnut Street, Philadelphia.

J. BLODGET BRITTON.

This Laboratory was established in 1866, at the instance
of a number of practical Iron-masters, expressly to afford
prompt and reliable information upon the chemical composition
of the substances above mentioned, for melting
and refining purposes. The object being to make it at
once a convenient, practically useful, and comparatively
inexpensive adjunct to the Furnace, Forge and Rolling
Mill.

CHARGES TO IRON WORKS.

For determining the per cent. of pure Iron in an
ordinary Ore..... \$4.00
For the per cent. of Pure Iron, Sulphur and Phos-
phorus in do..... 12.50
For each additional constituent of usual occur-
rence..... 1.50
For those of unusual occurrence or difficult to de-
termine, the charge must necessarily depend upon
circumstances.
For determining the per cent. of Sulphur and Phos-
phorus in Iron or Steel..... 12
For each additional constituent of usual occur-
rence..... 4.0
For the per cent. of Carbonate of Lime, and in-
soluble Silicious Matter in a Limestone..... 10.00
For each additional constituent..... 2.00
For the per cent. of Water, Volatile Combus-
tible Matter, fixed Carbon, and Ash in Coal..... 12.50
For determining the constituents of a Clay, Slag,
Grit, or other material, the charge will correspond
with those for the constituents of an ore.
For a written opinion or letter of instruction the charge
must necessarily depend upon circumstances.
Printed instructions for obtaining proper average sam-
ples for analysis furnished upon application.SCHOOL OF MINES,
COLUMBIA COLLEGE,
East 49th Street, NEW YORK.FACULTY:
F. A. P. MAYNARD, A. S. T. LL. D., President.
T. L. ELLISON, A. S. T. LL. D., Mining and Metallurgical
F. C. CHANDLER, Ph. D., Analytical and Applied
Chemist.JOHN TORREY, M. D., LL. D., Botany.
CHARLES A. JOY, Ph. D., General Chemistry.
WILLIAM G. PECK, LL. D., Mechanics and Mining
Engineering.
JOHN VAS AMIRING, A. M., Mathematics.
OGDEN N. GOOD, A. M., Physics.
JOHN S. NEWELL, M. D., Geology and Palaeontology.The plan of this school embraces a three years' course
for the degree of ENGINEER OF MINES, or, the BACHELOR OF PHILOSOPHY.
A student not qualified for a degree must pass an
examination in Arithmetic, Algebra, Geometry and
Plain Trigonometry. Persons not candidates for degrees
are admitted without examination, and may pursue any
or all of the subjects taught. The next session begins
October 1, 1875, and the examinations for admission will
be held on June 25th and September 25th, 1875. For
further information and catalogues, apply toDR. C. F. CHANDLER,
Dean of the Faculty.MAYNARD & VAN RENSSLAER,
CONSULTINGMining and Metallurgical
ENGINEERS,Experts in Iron and Analytical Chemistry's
26 1-2 Broadway, NEW YORK,
George W. Maynard, Schuyler Van Rensselaer.THOMAS M. DROWN,
Analytical Chemist.LAFAYETTE COLLEGE,
EASTON, PA.

STEAM PUMPS

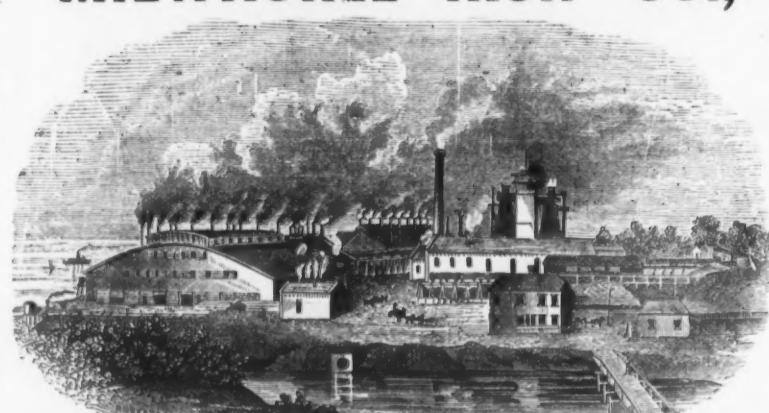
Manufactured
by
CRANE BROS.
MFG. CO.

Chicago.

Iron.

Iron.

MILWAUKEE IRON CO.,



RAILROAD IRON

From 30 to 65 Lbs. per Yard.

Re-Rolling done on short notice.

PIG IRON.

BEST NO. 1 FOUNDRY IRON constantly on hand and for sale in car-load or larger lots, at
lowest market price.

Merchant Bar Iron.

A FULL ASSORTMENT—SUPERIOR QUALITY.

Address all correspondence to

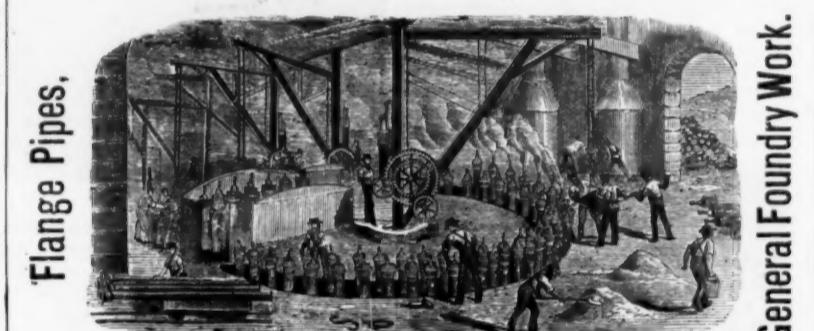
MILWAUKEE IRON CO.,
MILWAUKEE, WIS.

P. J. POTTER, JOHN W. HOFFMAN, WILLIAM TOOTHE, SOUTHDARD HOFFMAN

Potter, Hoffman & Co.,
110 Liberty St., N. Y.

GENERAL RAILROAD SUPPLIES.

AGENTS FOR

Bay State Iron Co., Boston, Mass.
Homogeneous Plates, Rails, &c.
Crucible Steel Tires, Axles, Forgings, &c.Chrome Tool Steel and Spring Steel.
Nichols, Pickering & Co.'s Springs.
Sax, Kear & Co.'s Patent Steel Tired
Wheels.JOHN MCNEAL & SONS,
BURLINGTON, N. J.CAST IRON PIPES
FOR WATER AND GAS.John H. Reed & Co.,
IRON MERCHANTS.

And Agents for

BAY STATE IRON CO.

Manufacturers of

and Dealers in

Homogeneous
Boiler and Fire
Box Plates.Plate, Sheet, Pig
and Railroad
Iron.

Wrought Iron Girder, Channel & Deck Beams.

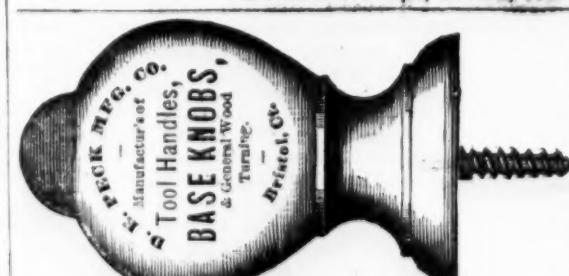
ANGLE & T IRON, BOILER & TANK RIVETS,

Lap-welded Iron Boiler Tubes,

Wrought Iron Steam & Gas Pipe.

OFFICES.

2 Pemberton Sq., Boston, Mass.

Having great facilities
for doing cheap work as
well as costly, using Way-
moth's variety turning lathe,
which in many kinds of
work will lessen the cost
at least one-half, we are
prepared to furnish paten-
tees and dealers with fin-
ished work in quantity.

Iron.

CAST IRON

FLANGE PIPES

Of any length or diameter, for Steam Engines, Exhaust Steam, Fire Purposes, Refineries,
both Faced and Drilled and Plain. Also,

GAS and WATER PIPES

Of all sizes, with necessary connections to
same.LAMP POSTS, FIRE HYDRANTS,
VALVES, &c.

R. A. BRICK & CO., Mfrs., 112 Leonard St., N. Y.

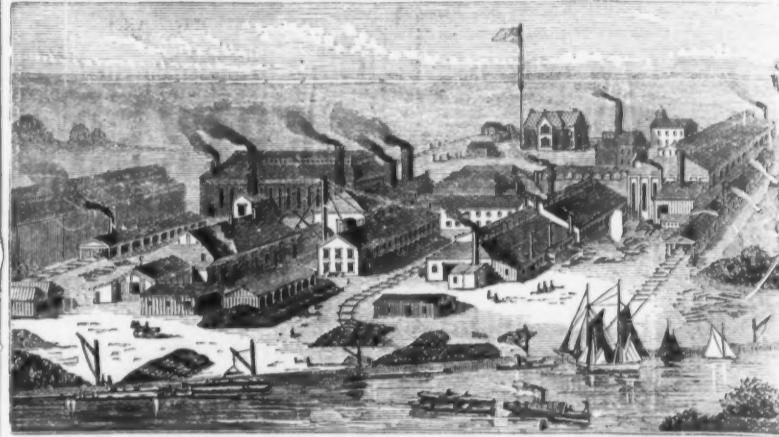
JESSE W. STARR.

BENJ. A. STARR.

BENJ. F. ARCHER.

CAMDEN IRON WORKS

(Established 1824), CAMDEN, N. J.



JESSE W. STARR & SONS,

Engineers, Contractors and Manufacturers of Gas Apparatus.

And all the

Buildings, Tanks, Holders, &c., required for the Manufacture, Purification, and Storage
of Gas, and Street Mains Requisite for its Distribution.

Plans, Drawings, and Specifications promptly furnished.

IRON FOUNDERS.

CAST IRON STREET MAINS, for Water and Gas, from One and a Half Inches to

FORTY-EIGHT Inches in Diameter.

Stop Valves (all sizes), FIRE HYDRANTS, HEATING PIPES, BRANCHES, BENDS, TEES,
CASTINGS of any form or size required.

PHILADELPHIA OFFICE, - - 403 WALNUT STREET.



ATKINS BROTHERS,

PROPRIETORS OF THE

Pottsville Rolling Mills & Pioneer Furnaces

POTTSVILLE, PENNSYLVANIA.

Having introduced New and Improved Machinery into their Rolling Mills, and manufacturing all their
Iron from the ore, and also doing all Machine Work and Repairs in their own shops, they are enabled to
produce

RAILROAD IRON

Of uniform quality, unsurpassed for strength and wear, and of any required length.

Address the Proprietors Pottsville, Pa.

The Britannia Ironworks Company, Limited,
Middlesbrough, England,

MANUFACTURERS OF

ALL DESCRIPTIONS OF IRON RAILS

Surplus Stocks of Various Sections always on hand.

London Office: W. G. FOSSICK, 6 Laurence Pountney Hill, E. C.

Weekly Output, One Thousand Tons.

HEATON & DENCKLA,
HARDWARE COMMISSION MERCHANTS.

PHILADELPHIA.

Branch Office, 103 Duane Street, New York.

AGENCIES:
Foster's Horse Nails,
American Screw Co.,
Douglas Axe Mfg. Co.,
Stewart, Peterson & Co.'s Cast-
ings, Morion & Bremmer's Balan-
ces, Givord Mfg. Co.'s Leeks,
Hoyle's Ford Sod Irons,
Givord Mfg. Co.'s Leeks,
Plymouth Mill Rives.Union Mfg. Co.'s Drilled
Bolts, Western File Works,
Plymouth Carriage Bolts,
Aiken's Saw Cast Steel, Octagon, Flat
and Square, &c., &c.

BAEDER, ADAMSON & CO.,

Manufacturers of

Sand and Emery Paper and Emery Cloth

(Also, in Rolls for machine work.)

GROUND EMERY, CORUNDUM AND FLINT,
Glue & Curled Hair, Cow Hide Whips.

STORES:

PHILADELPHIA, 730 Market St., BOSTON, 143 Milk St.,
NEW YORK 67 Beckman St., CINCINNATI, 93 Main St.,
CHICAGO, 182 Lake St.

ALFRED FIELD & CO.,

93 Chambers and 75 Renns Streets, N. Y.

IMPORTERS OF

The Birmingham Screw Co.'s
Improved Patent

Iron & Brass Wood Screws.

Full assortment constantly on hand.

W. & B. DOUGLAS,
MIDDLETOWN, CONN.

The Oldest and Most Extensive Manufacturer of

PUMPS,
HYDRAULIC RAMS,
GARDEN ENGINES

AND OTHER

Hydraulic Machines

IN THE

WORLD.

Awarded the GRAND MEDAL of PROGRESS at WORLDS' EXPOSITION, VIENNA, 1873, being the highest awards on Pumps, &c., also, highest medal at PARIS in 1867.

Descriptive Catalogues and Price Lists sent when requested.

BRANCH WAREHOUSES,

85 & 87 John Street, N. Y.

AND

197 Lake St., CHICAGO, III.



UNION MANUFACTURING COMPANY,

Manufacturers of all styles Plain and Ornamental Butts,

LOOSE PIN REVERSIBLE,

Drilled and Wire Jointed.

Cast Fast & Loose,

Japanned, Figured Enamelled, Nickel Plated,

and Real Bronze Butts. A. so. & full line of

IRON & BRASS PUMPS,

Clayton, Well, and Force Pumps, Yard, Drive

Water, Gated, Engine, and Pumping, Boiler Pumps,

Hydraulic, Hand, etc., and all with the most modern

Improvements.

NEW BRITAIN, CONN.

(99 Chambers Street, N. Y.

Warehouses, 14 India Street, Boston, (Butts.)

67 Kilby Street, Boston, (Pumps.)

Send for New Illustrated Catalogue and Price List.

CHARLES E. LITTLE, 59 Fulton St., N. Y.

MECHANICS' AND MACHINIST TOOLS,

COOPERS' TOOLS & TRUSS HOOPS a specialty

Agent for

Merchant's Improved

Dowelling

Machines.

Slater's and

Coach Makers'

Tools.

Sold at **Cast Steel Pump Auger**

Any one in the trade not receiving my new Price List will please inform me.

G. W. BRADLEY'S EDGE TOOLS.

Butchers' Cleavers,
Corn Knives,
Bush Hooks,
Coopers' Tools,
Ship Adzes and Axes,
Drawing Knives,
Axes and Hatchets,
Grub Hoes,
Picks and Mattocks,
Mill Picks,
Box Chisels & Scrapers.

NATHAN WEED, 37 Chambers St., New York.

WRIGHT'S
Double Acting,
BUCKET - PLUNGER
STEAM PUMPS.
ALWAYS RELIABLE
VALLEY MACHINE CO., Easthampton, Mass.

KANAWHA

PUMP WORKS

Burlingham & Purdy,

PROPRIETORS.

Depots:

88 Camden Street,
Baltimore, Md.

103 Chambers Street,
New York.

Factory, Charleston,
West Virginia.

Manufacture the Genuine

CUCUMBER
WOOD PUMPS.

Price List with description sent
on application.

See wholesale price current in
this paper.



OSBORN MFG. CO.
79 TRADE MARK 79
BLEECKER ST. NEW YORK.

OSBORN'S METAL CAGES.

The Original Inventor and Manufacturer of the
OSBORN BRIGHT METAL CAGES.

Also OSBORN & DRAZON improvements under
twelve different patents. We are continually bringing
out new and beautiful designs to meet the demands of
household and trade.

ALVAN DRAZON, General Agent.

SPRAGUE SASH WEIGHT CO.,
YOUNGSTOWN, OHIO,

Manufacturers of

SPRAGUE'S IMPROVED

Sectional Sash Weights.

Orders solicited from all parts of the country

Fuel Economy in the Puddling Process.

We take the following from *Iron*:

It has been ascertained by actual inquiry that there are not less than eight thousand puddling furnaces in work throughout this country at this moment. The collateral branches of forging and fashioning wrought iron involve the existence of nearly double this number of furnaces. Fifteen tons of coal per week is about a fair estimate of the average consumption for each furnace. Thus, allowing a margin for stoppages for repairs, and for other sources of idleness, it will be found that in the furtherance of these great branches of our national industry, nearly ten millions of tons of coals are annually used.

A glance at these simple but comprehensive and reliable statistics will at once demonstrate the magnitude of the interests—monetary and industrial—involved in the important section of work to which they refer. Further consideration cannot fail to suggest, also, the desirability of lessening by every available means the enormous amount of fuel consumed. Metallurgists, chemists and engineers have, indeed, devoted during the last few years very much of enlightened attention, and assiduous labor to the question of economizing fuel generally, and their exertions have been crowned with a certain measure of success. Still it is a fact, that so far as puddling furnaces and others connected with the manufacture of wrought iron are concerned, they remain pretty much as they were forty or fifty years ago. As a rule, under existing circumstances, the amount of heat taken up by a charge of iron constitutes but a small portion of the whole heat generated by the furnace. The remainder passes off into the atmosphere. It is true that the escaping products of combustion are in some cases passed through boilers, thus leaving behind them a few units of heat for the generation of steam; but, in the main, those products are wasted on the desert air without check of any kind.

Efforts have been made of late—and notably by Dr. Siemens and Mr. Crampton—to remedy this unsatisfactory state of things. To the first-named gentleman must be awarded the credit of being, as it were, the pioneer of furnace economy. He has taught and illustrated the value of regenerating, and that very high temperatures are possible, practicable, and economical. Yet the regenerative gas furnace has not made headway amongst iron masters. It has met with the most faint praise or encouragement at their hands, and is apparently not destined—however ingenious and effective—to supersede, largely, the old reverberatory furnace.

The coal dust system of Mr. Crampton, for raising high temperatures, economizing fuel, and at the same time, minimising the evil of oxidation in rotary puddling furnaces, has been for some time under process of experimentation at Woolwich Arsenal. A certain amount of success has been at present attained, and there is reason to expect more advantage in the future. Mr. Crampton's mode of injecting the fuel into the furnace, and thus promoting combustion in the immediate region of the metal, without the aid of fixtures or fire grates, allows of the absolute closing of one end of the revolving barrel, whilst a stream of water, by means of a double way pipe, placed in line with the axis of the latter, is made to circulate throughout every portion of the external surface of the furnace. Thus a nearly perfect equilibrium of temperature through the machine is maintained during the process of puddling. This avoidance of the proximity of great heat to the mechanism for rotating the furnace which Mr. Crampton has effected, and which will be the bane of all other contrivances for mechanical puddling, is undoubtedly a valuable point gained. The violent and constant alternations of expansion and contraction, which have torn other apparatus for similar purposes to pieces, cannot take place in the Crampton furnace. Possibly, therefore, the "coal dust system" may eventuate in the confirmation of rotary puddling as a permanent institution.

It is highly to the credit of the authorities of the Royal Arsenal at Woolwich that they are giving every possible attention to the momentous question of making good iron, and economizing fuel in the process. For many months past experiments have been conducted at that place with these laudable objects in view, and the results are certain to be of infinite value. One of the principal aims of those who have so zealously been working at Woolwich has been to prevent oxidation going on whilst the metal was under the influence of extremely high temperatures. This, it will be manifest, is a thing of vital consequence, for vain would be the economization of fuel if it were attended by a corresponding loss of metal. At present the best results effected by ordinary puddling furnaces prove, that on every ton of iron puddled, 10 per cent. must be charged for loss by oxidation, and this before it reached the condition of bars. Now, as the annual make of wrought iron in Great Britain is, in round numbers, three and a half millions of tons, it is clear that three hundred and fifty thousand tons of metal are yearly wasted, or returned to the normal state of an oxide. Here, then, there is ample room and scope enough for improvement. Oxidation, indeed, means something more than mere waste. In puddling furnaces, where the "cutting" action, under high temperatures, prevails, the iron is not only burnt, but permeated with cinder, and thus rendered bad.

Regarded, therefore, from whatsoever point of view it may, the prevention—or, at all events, the reduction of oxidation to the most extreme degree possible—is a point to be striven for unceasingly. During the attempts made at the arsenal to accomplish the desideratum, many interesting and peculiar phenomena were observed and recorded. They, however, need not be referred to further in this place. We wish rather to attract the attention of our readers to

realized facts and substantial results. These facts and results cannot fail, as it is believed, to gain consideration from all who are concerned, directly or indirectly, in the vast iron industries of this and other countries. In the royal gun factories department at Woolwich very much of the work to which we refer has been carried on, and is now in full operation. A grate furnace of the old style has been modified and utilized for the improved duty it was expected to perform.

In this furnace a new chamber was added at the rear of the existing fire chamber. This arrangement compelled the fire-bars to occupy a position in the middle, instead of being at the end of the furnace. The additional chamber is really formed as an upcast for the escaping products of combustion, which are conveyed into it from the opposite end of the furnace, and by means of a subterranean flue. The upcast chamber is placed a conical retort, supported in a central position on a brick pillar, and surrounded by an open space through which the gases freely circulate. The retort, which is 10 feet in height, is of cast iron, and on its upper extremity rests a hopper, by aid of which the retort may be charged at will. A damper prevents the access of air or the escape of gas. The retort is provided with what may be termed two necks, one leading into the combustion chamber, through which the fuel is passed on to the fire-bars, and the other, on the opposite side, opening to the end, through which stoking iron or a mechanical apparatus can be applied for forcing the fuel, when needful, on to the fire-bars. The mode of lighting the furnace is to place wood on the grate-bars and kindle the fire in the ordinary way. Then the generated gases passing off find their way into the vicinity of the retort, which latter, by the time the furnace is fit for charging, will be found to have attained to very nearly a red heat.

When this is really so, the retort is charged with fuel and allowed to remain for some two or three hours. Then the stocking commences at the lower end of the retort, and the incandescent material—originally coal, but now converted into coke—finds its way gradually on to the fire-bars. The law of gravity brings down more and more of the fuel, and fresh supplies from the hopper feed the retort at its upper end or mouth. Thus the fuel in the retort is deprived of its gaseous elements, and coked by the agencies which in other cases would pass off idly through the chimney stalk—namely, the waste products of the furnace. About 25 per cent. of the fuel reaches the gaseous stage at a comparatively low temperature, namely 1000° Fahr. The hydrogen and hydrocarbons, which in the charging of raw fuel are either imperfectly consumed from want of air and heat, or mix their equivalents at the wrong place to be serviceable, namely, in the flue or the stack, are here absolutely utilized in their entirety.

The main purpose of the retort is really to separate the distinct properties of the fuel from each other, and then admit the resulting elements into the furnace under the most advantageous circumstances. Then the coke, first heated to redness, enters the fire in a condition to promote and support combustion, and so not a particle of the fuel, gaseous or solid, can possibly be wasted. Here, then, we see the saving of fuel exemplified in the most striking and complete manner, and in strict accordance both with scientific principles and natural laws.

While awaiting further and official information as to quantity of product and other details, we summarise for our readers the report we have received of what has been effected in the arsenal during the past few months with furnaces, on what may be denominated the "retort" plan, as compared with the results of common practice outside that establishment.

During a period of ten weeks of continuous night and day work, the single retort furnace at Woolwich produced, of puddled iron, 1 ton for every 13 cwt. of coal used. In the ordinary single puddling furnace, as used out of doors, the consumption is at the rate of 24 cwt. of coal per ton. This exhibits a saving of 45 per cent. of fuel in favor of the arsenal. Again, a reheating furnace working at the latter place for six months gave results, comparing with the common furnace, in the proportion of 4½ cwt. to 8 cwt. of coal per ton of iron, or a saving of 45 per cent. The double puddling furnace, on the retort principle, showed an advantage of 45 per cent. over the common furnace of a like kind.

As a rule the waste in a common puddling furnace, even with best of fettling, may be taken at 5 per cent. for a single furnace, and 10 per cent. for a double furnace, the larger capacity being conducive to oxidation, owing to the greater exposure of the "heat" to the influx of air from the working holes in balling up.

The waste in the single-retort puddling furnace, has been uniformly found to be less than 2½ per cent. of iron, and in the double-retort furnace it has proved to be below 5 per cent., whilst the fettling used in the single furnace was 6 per cent. against 8 per cent., and in the double, 4 per cent. against 6 per cent.

This, with coal at 10 per ton, and fettling at 80/, would effect a saving in each class of furnace of from 10/ to 12/ per ton of puddled iron, on the materials employed in producing it. The saving, nevertheless, does not end here. The retort furnaces, themselves, from their peculiar construction, the more perfect combustion of the gases within them, their freedom from fluctuations of temperature, as well as from other minor causes, are far more durable than those constructed on the ordinary plan.

Another great point to be gained by and by, as it is expected, will be further economy resulting from the heating of the blast to a greater extent than at present. The Woolwich experimenters have not hitherto heated it to above

300° Fahr., yet this has been sufficient to make manifest the economy of the practice. It is also intended, if found practicable, to introduce mechanical puddling. Thus, heated air, pre-heated fuel, larger capacity and labor saving arrangements will all be concentrated and combined, so as to ensure a yet greater economy of fuel, and the production of better iron. Then, by adopting the continuous working on the three-shift system in addition, the Woolwich authorities are sanguine of being able to produce fifty tons of iron puddled per week, with possibly 5 cwt. of coal and 2 cwt. of fettling per ton.

A Cincinnati Bolt and Screw Factory.

The Cincinnati *Trade Review* says: The firm of Hotchkiss & Gaylord, of this city, was organized in the autumn of 1874, for the manufacture of machine, bridge and plow bolts, and the business was commenced in the month of October of that year, works having been erected on the "Flats," near the Cleveland Iron Company's Rolling Mill. Though the condition of business affairs at that period was not altogether auspicious for the inauguration of a new enterprise of any character, still the new firm entered upon their undertaking confident of their ability to command a market upon the merit of their work, which it was a part of their design should be unsurpassed. It is a fact in the experience of every business man that there is always "room for one more," if that one is able to successfully compete in the quality and excellence of his wares, and the experience of Messrs. Hotchkiss & Gaylord illustrates this fact. In the face of the depression in all portions of the country, the firm has experienced a steady progress in its business, until what might have been conceived by some at the outset to be in some degree an experiment, has become a permanent entity, with most flattering promise for the future.

The works of the firm consist of a building 110x50 feet, embracing a forging room, 50x50 feet, a finishing room 60x50 feet, and apart from these an engine room 20x30 feet. In the forging room are four heading machines and two presses, and in the finishing room, five cutting lathes, two pointing lathes, two tapping lathes, engine lathes, planers, etc. The engine is of 35 horse-power, and all the machinery is run by steam. The machinery employed is all of the most modern pattern and make, the larger portion having been made to the order of the firm. The present capacity of the works is equal to the production of from 25,000 to 30,000 finished bolts daily, and about 2000 pounds of screws; but the firm are contemplating the addition of machinery which will increase the capacity of the works, the necessity for such increase in the near future being pretty well assured. At present employment is given to 30 hands. The market for the goods is not limited to any particular locality, but extends to all parts of the country, and to Canada, and is steadily widening.

The works are under the immediate supervision of Mr. C. A. Hotchkiss, late of the Plant Manufacturing Company, of Plantsville, Conn., who has a practical knowledge of the business acquired through the experience, as workman and manager, of a score of years of active employment. Mr. Gaylord has been during the greater portion of his life connected with manufacturing enterprises, having latterly been associated with the Collins Axe and Tool Company, of Hartford, Conn., the most extensive establishment of the kind in this country, if not in the world. The business is therefore in capable and experienced hands, and with a foundation of ample capital, and a reputation and character already well established and widely extended, the continued prosperity and progress of the firm is assured.

Recognizing the Facts.—The London *Mining Journal* has been publishing a series of articles on the iron ore region of Lake Superior and other portions of the United States, from one of which we extract the following: "The constant extension of industrial enterprise in the United States, and the vastness of the American coal deposits, have naturally caused British iron masters to regard America as the country from which most active competition with English iron in the markets of the world is to be expected, and the abundance of the iron deposits, and their distribution throughout the various parts of the Union, certainly appear to justify that feeling. The mineral wealth of iron in the United States has never been appreciated, either at home or abroad, though it is claimed that at the present day no more judicious or profitable investment of capital can be made in the world than in the iron ore lands of the United States. For centuries to come the abundance of ores cannot be exhausted, nor that of the fuel to reduce them. At

Reasons for Using our Goods.

Hogs when ringed are prevented from rooting, and fatten quickly.

Pastures and clover fields are kept smooth and are not destroyed by the hogs rooting them up.

Feed lots in the winter are kept smooth, and corn that is otherwise rooted and tramped into the ground is saved.

The Triangular Wire Ring, manufactured only by us, is the only wire ring that can be inserted in the hog's nose with one grip on the Ringer, and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.



THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent Increment Cut, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly expanding or increasing in size and space from the point, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will not be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "Increment File" is not an experiment, but an established fact, and already has acquired a legitimate demand or upwards of 500 dozen per day. We employ no regular Travelers, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

NICHOLSON FILE COMPANY,
Providence, R. I.

USE THE BEST.



Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

FILES { **XTRA QUALITY,**
MADE FROM THE BEST
AND **IMPORTED STEEL**
BY THE
Auburn File Works,
AUBURN, N. Y.

JOHN ROTHERY'S
Celebrated Hand-Cut FILES,
Made of Best English Cast Steel.

WALSH, COULTER & FLAGLER, Sole Agents,
83 Chambers and 65 Reade Streets, N. Y.

EDWARD PHELAN,
Surviving Partner of W. F. SHATTUCK & CO.,
No. 113 Chambers and 95 Reade Streets, New York,
MANUFACTURER OF AMERICAN HARDWARE.

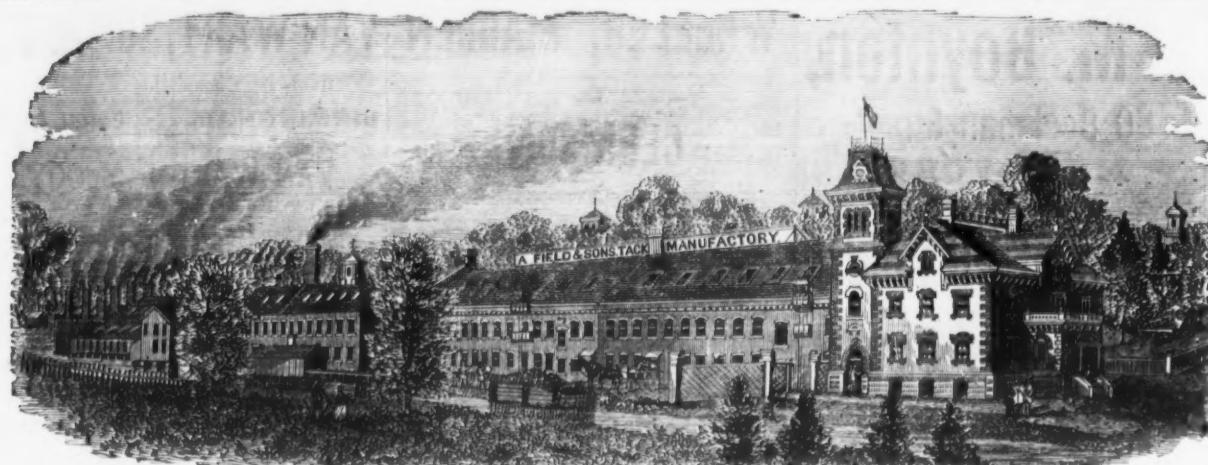
Coss & Taft's Pat. Wrenches, Cocoa Nut Dippers.
Ax. Pick, Sledge & Hammer, Wire Saws.
Handles, Scale Beams.
Gimlets and Gimlet Bits, Patent Tap Borers.
Augers and Auger Bits, Brundage Horse Nails.

DEAN'S New Patent (1873)
Screening Scoop

SHOVEL

For Coal, Coke and Coal Ashes, and other Substances.

The largest frames are 12 by 18 inches, with seven bars, and are made of the Best Malleable Iron. They are, or can be, wired between bars by an arrangement of holes a quarter of an inch apart, by an ordinary person, to screen sizes of 1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4, 4 1/2, 5, 5 1/2, 6, 6 1/2, 7, 7 1/2, 8, 8 1/2, 9, 9 1/2, 10, 10 1/2, 11, 11 1/2, 12, 12 1/2, 13, 13 1/2, 14, 14 1/2, 15, 15 1/2, 16, 16 1/2, 17, 17 1/2, 18, 18 1/2, 19, 19 1/2, 20, 20 1/2, 21, 21 1/2, 22, 22 1/2, 23, 23 1/2, 24, 24 1/2, 25, 25 1/2, 26, 26 1/2, 27, 27 1/2, 28, 28 1/2, 29, 29 1/2, 30, 30 1/2, 31, 31 1/2, 32, 32 1/2, 33, 33 1/2, 34, 34 1/2, 35, 35 1/2, 36, 36 1/2, 37, 37 1/2, 38, 38 1/2, 39, 39 1/2, 40, 40 1/2, 41, 41 1/2, 42, 42 1/2, 43, 43 1/2, 44, 44 1/2, 45, 45 1/2, 46, 46 1/2, 47, 47 1/2, 48, 48 1/2, 49, 49 1/2, 50, 50 1/2, 51, 51 1/2, 52, 52 1/2, 53, 53 1/2, 54, 54 1/2, 55, 55 1/2, 56, 56 1/2, 57, 57 1/2, 58, 58 1/2, 59, 59 1/2, 60, 60 1/2, 61, 61 1/2, 62, 62 1/2, 63, 63 1/2, 64, 64 1/2, 65, 65 1/2, 66, 66 1/2, 67, 67 1/2, 68, 68 1/2, 69, 69 1/2, 70, 70 1/2, 71, 71 1/2, 72, 72 1/2, 73, 73 1/2, 74, 74 1/2, 75, 75 1/2, 76, 76 1/2, 77, 77 1/2, 78, 78 1/2, 79, 79 1/2, 80, 80 1/2, 81, 81 1/2, 82, 82 1/2, 83, 83 1/2, 84, 84 1/2, 85, 85 1/2, 86, 86 1/2, 87, 87 1/2, 88, 88 1/2, 89, 89 1/2, 90, 90 1/2, 91, 91 1/2, 92, 92 1/2, 93, 93 1/2, 94, 94 1/2, 95, 95 1/2, 96, 96 1/2, 97, 97 1/2, 98, 98 1/2, 99, 99 1/2, 100, 100 1/2, 101, 101 1/2, 102, 102 1/2, 103, 103 1/2, 104, 104 1/2, 105, 105 1/2, 106, 106 1/2, 107, 107 1/2, 108, 108 1/2, 109, 109 1/2, 110, 110 1/2, 111, 111 1/2, 112, 112 1/2, 113, 113 1/2, 114, 114 1/2, 115, 115 1/2, 116, 116 1/2, 117, 117 1/2, 118, 118 1/2, 119, 119 1/2, 120, 120 1/2, 121, 121 1/2, 122, 122 1/2, 123, 123 1/2, 124, 124 1/2, 125, 125 1/2, 126, 126 1/2, 127, 127 1/2, 128, 128 1/2, 129, 129 1/2, 130, 130 1/2, 131, 131 1/2, 132, 132 1/2, 133, 133 1/2, 134, 134 1/2, 135, 135 1/2, 136, 136 1/2, 137, 137 1/2, 138, 138 1/2, 139, 139 1/2, 140, 140 1/2, 141, 141 1/2, 142, 142 1/2, 143, 143 1/2, 144, 144 1/2, 145, 145 1/2, 146, 146 1/2, 147, 147 1/2, 148, 148 1/2, 149, 149 1/2, 150, 150 1/2, 151, 151 1/2, 152, 152 1/2, 153, 153 1/2, 154, 154 1/2, 155, 155 1/2, 156, 156 1/2, 157, 157 1/2, 158, 158 1/2, 159, 159 1/2, 160, 160 1/2, 161, 161 1/2, 162, 162 1/2, 163, 163 1/2, 164, 164 1/2, 165, 165 1/2, 166, 166 1/2, 167, 167 1/2, 168, 168 1/2, 169, 169 1/2, 170, 170 1/2, 171, 171 1/2, 172, 172 1/2, 173, 173 1/2, 174, 174 1/2, 175, 175 1/2, 176, 176 1/2, 177, 177 1/2, 178, 178 1/2, 179, 179 1/2, 180, 180 1/2, 181, 181 1/2, 182, 182 1/2, 183, 183 1/2, 184, 184 1/2, 185, 185 1/2, 186, 186 1/2, 187, 187 1/2, 188, 188 1/2, 189, 189 1/2, 190, 190 1/2, 191, 191 1/2, 192, 192 1/2, 193, 193 1/2, 194, 194 1/2, 195, 195 1/2, 196, 196 1/2, 197, 197 1/2, 198, 198 1/2, 199, 199 1/2, 200, 200 1/2, 201, 201 1/2, 202, 202 1/2, 203, 203 1/2, 204, 204 1/2, 205, 205 1/2, 206, 206 1/2, 207, 207 1/2, 208, 208 1/2, 209, 209 1/2, 210, 210 1/2, 211, 211 1/2, 212, 212 1/2, 213, 213 1/2, 214, 214 1/2, 215, 215 1/2, 216, 216 1/2, 217, 217 1/2, 218, 218 1/2, 219, 219 1/2, 220, 220 1/2, 221, 221 1/2, 222, 222 1/2, 223, 223 1/2, 224, 224 1/2, 225, 225 1/2, 226, 226 1/2, 227, 227 1/2, 228, 228 1/2, 229, 229 1/2, 230, 230 1/2, 231, 231 1/2, 232, 232 1/2, 233, 233 1/2, 234, 234 1/2, 235, 235 1/2, 236, 236 1/2, 237, 237 1/2, 238, 238 1/2, 239, 239 1/2, 240, 240 1/2, 241, 241 1/2, 242, 242 1/2, 243, 243 1/2, 244, 244 1/2, 245, 245 1/2, 246, 246 1/2, 247, 247 1/2, 248, 248 1/2, 249, 249 1/2, 250, 250 1/2, 251, 251 1/2, 252, 252 1/2, 253, 253 1/2, 254, 254 1/2, 255, 255 1/2, 256, 256 1/2, 257, 257 1/2, 258, 258 1/2, 259, 259 1/2, 260, 260 1/2, 261, 261 1/2, 262, 262 1/2, 263, 263 1/2, 264, 264 1/2, 265, 265 1/2, 266, 266 1/2, 267, 267 1/2, 268, 268 1/2, 269, 269 1/2, 270, 270 1/2, 271, 271 1/2, 272, 272 1/2, 273, 273 1/2, 274, 274 1/2, 275, 275 1/2, 276, 276 1/2, 277, 277 1/2, 278, 278 1/2, 279, 279 1/2, 280, 280 1/2, 281, 281 1/2, 282, 282 1/2, 283, 283 1/2, 284, 284 1/2, 285, 285 1/2, 286, 286 1/2, 287, 287 1/2, 288, 288 1/2, 289, 289 1/2, 290, 290 1/2, 291, 291 1/2, 292, 292 1/2, 293, 293 1/2, 294, 294 1/2, 295, 295 1/2, 296, 296 1/2, 297, 297 1/2, 298, 298 1/2, 299, 299 1/2, 300, 300 1/2, 301, 301 1/2, 302, 302 1/2, 303, 303 1/2, 304, 304 1/2, 305, 305 1/2, 306, 306 1/2, 307, 307 1/2, 308, 308 1/2, 309, 309 1/2, 310, 310 1/2, 311, 311 1/2, 312, 312 1/2, 313, 313 1/2, 314, 314 1/2, 315, 315 1/2, 316, 316 1/2, 317, 317 1/2, 318, 318 1/2, 319, 319 1/2, 320, 320 1/2, 321, 321 1/2, 322, 322 1/2, 323, 323 1/2, 324, 324 1/2, 325, 325 1/2, 326, 326 1/2, 327, 327 1/2, 328, 328 1/2, 329, 329 1/2, 330, 330 1/2, 331, 331 1/2, 332, 332 1/2, 333, 333 1/2, 334, 334 1/2, 335, 335 1/2, 336, 336 1/2, 337, 337 1/2, 338, 338 1/2, 339, 339 1/2, 340, 340 1/2, 341, 341 1/2, 342, 342 1/2, 343, 343 1/2, 344, 344 1/2, 345, 345 1/2, 346, 346 1/2, 347, 347 1/2, 348, 348 1/2, 349, 349 1/2, 350, 350 1/2, 351, 351 1/2, 352, 352 1/2, 353, 353 1/2, 354, 354 1/2, 355, 355 1/2, 356, 356 1/2, 357, 357 1/2, 358, 358 1/2, 359, 359 1/2, 360, 360 1/2, 361, 361 1/2, 362, 362 1/2, 363, 363 1/2, 364, 364 1/2, 365, 365 1/2, 366, 366 1/2, 367, 367 1/2, 368, 368 1/2, 369, 369 1/2, 370, 370 1/2, 371, 371 1/2, 372, 372 1/2, 373, 373 1/2, 374, 374 1/2, 375, 375 1/2, 376, 376 1/2, 377, 377 1/2, 378, 378 1/2, 379, 379 1/2, 380, 380 1/2, 381, 381 1/2, 382, 382 1/2, 383, 383 1/2, 384, 384 1/2, 385, 385 1/2, 386, 386 1/2, 387, 387 1/2, 388, 388 1/2, 389, 389 1/2, 390, 390 1/2, 391, 391 1/2, 392, 392 1/2, 393, 393 1/2, 394, 394 1/2, 395, 395 1/2, 396, 396 1/2, 397, 397



A. FIELD & SONS, TAUNTON, MASS., Manufacturers of Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and steel Shoe Nails, Carpet, Brush and Cimp Tacks, Common and Paten Brads, Finishing Nails
Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Paten Copper Plated Tacks and Nails
Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks,
Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

OTIS PASSENGER AND FREIGHT ELEVATORS

For HOTELS, OFFICE BUILDINGS, STORES,
WAREHOUSES, FACTORIES, MINES,
BLAST FURNACES, &c.

OTIS BROTHERS & CO.
SOLE MANUFACTURERS,
348 Broadway, New York.

EMPIRE PORTABLE FORGES

NO BELTS, BELLows OR CRANKS

The Best Made.

Send for Catalogue to the
Empire Portable Forge Co., Troy, N. Y.

THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.
Surplus - \$1,800,000, Gold.

The New York Agency, 50 Wall St.,
Buys and sells Sterling Exchange, makes Cable
Transfers, grants Commercial Credits, and transacts
other Banking Business.

J. G. HARPER, Agents.
J. H. GOADBY, Agents.

TACKLE BLOCKS BURR & CO

Manufacturers of Waterman and Russell'

PATENT IRON STRAPPED BLOCKS
ALSO, MANUFACTURERS OF
ROPE STRAPPED BLOCKS,
81 PECK SLIP, NEW YORK

Tempered Steel Spiral Springs,

Of all sizes and descriptions, made to order by
JOHN CHATILLON & SONS, 91 & 93 Cliff St., N. Y.
Our Springs are used by the U. S. Government, and various Meteorological and other Scientific Institutions.

BUSINESS ITEMS.

PENNSYLVANIA.

The Philadelphia Engineer, of the 5th instant, says: Rieble Brothers, proprietors of Philadelphia Scale and Testing Machine Works, are now repairing for the Pennsylvania Railroad Company a one hundred (100) ton railroad track scale, which was built for the then State Road in the year 1850 (twenty five years ago), and has been in service ever since. This was one of three scales built for the same company at these works, and they were the first successful long track scales built in the country. It might be here mentioned that the first platform scale with graduated weighing beam was invented and built by the predecessors of this establishment. This firm supplies the Philadelphia and Reading Coal and Iron Company with scales. Also sells to the Pennsylvania Railroad Company. At present they are filling a large order for the Lackawanna Iron and Coal Company for scales for their new Bessemer Works, at Scranton, Pa.

The Blair Iron and Steel Company, of Blair county, are putting up a new open-hearth melting furnace, and are erecting a building for it. When this furnace is completed the capacity of the works will be 94 tons of steel ingots per week. This company's steel is manufactured from an iron sponge, made by what is called the "Blair direct process," and the demand for it is so enormous that they could dispose of 10 times the amount their works is capable of producing.

The boiler fires at the Ferndale Rolling Mill, Allentown, were started last week, and it is probable that the mill will resume operations shortly.

The Locomotive Shops of the Dickson Manufacturing Company, at Scranton, were destroyed by fire February 28th. Loss, \$500,000; insurance, \$85,000. Two hundred and fifty men are thrown out of employment by the burning of this establishment.

Bowman's rolling mill, at Lebanon, is making fine sheet iron at the rate of forty-five tons per week, and employing sixty workmen. On Monday the force will be increased to one hundred men, and about eighty-five tons manufactured weekly.

Forty-eight colored boilers, from Danville and Richmond, Va., have been engaged to take the places of the men at the Pittsburgh Bolt Works, near Soho, who refused to work at the wages offered by the proprietors.

Pott's Bro.'s Rolling Mill, at Pottstown, has resumed operations on a two weeks, "run," at the end of which a longer "run" is expected to be announced.

OHIO.

In 1874 Akron manufactured 600 tons of stove and hollow ware, 400 tons of bar and railroad iron, 3,476,600 gallons of stoneware, two portable saw mills, 400 plows, 50 tons of wheels, and 700 tons of other castings, 5242 reapers and 1964 mowers.

Coppas Brothers, of Medina county, have purchased the Freer Rake Factory, in Orrville, of Jacob and Christian Brenneman, and will engage in the manufacture of a new improved threshing machine. The citizens contributed \$1000.

The round house of the Cincinnati, Sandusky and Cleveland Railroad, at Springfield, was burned March 1, with five locomotives and the machine shop adjoining. Estimated loss \$50,000 to \$70,000. Buildings insured for \$7500; insurance on contents not stated.

The Milburn Wagon Company, which has just completed the erection of extensive works at Toledo, will prove a most important addition to the manufacturing industries of that city. The productive capacity of the shops is equal to the manufacture of 30,000 wagons a year, or one wagon in eight minutes. This can be increased to 30,000 per annum with but slight additions to the machinery, and none to the buildings. The making of the 20,000 wagons requires the service of 500 operatives. It will require 5,000,000 feet of lumber to supply the factory, and 6,000,000 pounds of iron. The cost of these buildings was \$130,000, and of machinery, \$50,000. The company now manufacture freight, farm and spring wagons, and during the coming season will begin the manufacture of buggies and express wagons. The management of the company is invested in the following gentlemen: George Milburn, president; J. H. Whitaker, vice-president; G. R. Hudson, secretary and treasurer; J. Milburn, superintendent; W. W. Griffith, A. L. Kelsey and Wm. Baker.

The Cuyahoga Falls Rivet Company is putting up an additional machine to fill increasing orders.

MISSOURI.

Messrs. Moffet & Sergeant have completed and are successfully running their new furnace at Lone Elm. The building is 70x50. There is a 30 horse-power engine to supply blast and work the crusher, jigs and pump. Additions to the capacity will soon be made.

WISCONSIN.

The iron stack of the National Iron Company, at Depere, is reported blown in.

One stack of the Fox River Iron Company, at West Depere, has been in blast about two weeks, producing steel iron for rail purposes.

Floor Construction.

Floors should be specially constructed for what they have to carry. Thus, for instance, a floor for a warehouse containing heavy goods should be much stronger than a floor which has to carry only light goods; and, again, a floor of any warehouse should be stronger than that of any ordinary private house of moderate dimensions.

This statement may seem superfluous and unnecessary to any one considering the subject from an abstract point of view, as it is obvious that the only alternative would be to build

every floor of sufficient strength to carry the heaviest goods, or the weight of the largest number of persons that could be closely packed together, or both combined, and in addition able to withstand exceptional shocks and thrusts from machinery, movement of persons goods, etc., and that on account of the expenses alone, independently of other contingencies, this alternative would be wholly out of the question.

It is, however, by no means superfluous to those who are forced to consider the subject in connection with the existing condition of buildings, and who are professionally engaged in obviating the consequences of careless and defective construction, and of those changes in the uses of buildings which are unfortunately permitted in many great cities.

The next points, after the intrinsic strength of the floors, are the nature, style and strength of their supports. A floor supported, as is frequently the case, on nothing but stone projections can never be trusted after the temperature has been suddenly raised to any considerable extent.

When the surrounding walls are of stone, a continuous stone projection all round is permissible, as the chances are against the whole splitting and falling together, but even in this case it is much safer to have a longitudinal piece of wrought iron or hard wood laid as a sleeper above the stone.

The safest description of the latter support for floors is to have a portion of the walls corbelled out in brick, which will never yield to heat, whether applied gradually or suddenly.

Floors which have a very large area, or have to carry heavy loads, should invariably be provided with central or intermediate supports, and the more these are made of some material which can resist the efforts of heat the better. For this purpose wood of any kind, but especially hard wood, is infinitely preferable to stone or iron.

Cast iron columns, in consequence of the small space they occupy, are now much used for supporting floors of warehouses and shops, where light and room are of great consequence, and their strength is usually calculated according to the weight which they are designed to carry, the breaking strain being generally considerably over the load, thus allowing a sufficient margin for exceptional contingencies such as vibration, or the falling of heavy bales of goods; but in this calculation the question of any other temperature than that of the ordinary atmosphere appears to have been lost sight of altogether, and when it is remembered that, at a temperature of 212° Fahrenheit, or the boiling point of water, cast iron loses about 15 per cent. of its strength; that, at the temperature of molten lead 612° Fahrenheit, it has probably no strength at all; and that, at a temperature of 2787° Fahrenheit, which is probably much below that of the center of a large building on fire, it becomes liquid, it seems advisable to supplement this material with some other more trustworthy in case of heat.

When it is necessary to use iron columns, they will be found much more capable of resisting the effects of heat if made solid and not hollow, as is most commonly the case.

For the purpose of support an occasional brick column would answer best, but, as there would certainly be much objection to the space it would occupy, and the consequent obstruction to light, it appears hopeless in ordinary cases to expect it to be done; however, in all other one woolen story post might with advantage be substituted for every fourth iron column. For the story post oak or elm would be the best timber to use, and the remaining iron columns might be to a considerable extent protected by plaster.

It is somewhat unfortunate that of late years the words fire-proof and incombustible have been used indifferently, and it must be acknowledged that some existing acts of legislature have given legislative sanction to the error.

These are, however, by no means synonymous terms; on the contrary, there are many cases in which combustible substances are much more proof against the fire than non-combustible, as an instance of which may be cited the acknowledged fact, proved by long experience in this and other countries, and now placed beyond doubt, that good oak or other hard wood posts with girders and joists filled well in with proper concrete prepared for the purpose come nearer to fire-proofing than any arrangement of iron combined with brick or stone hitherto brought into use.

Floors should invariably be brought in so close to the walls that there should be no possibility of either flame or smoke passing, even when the joists or other supports spring and buckle, as they frequently do during fires from the weight of either water resting on them, large bodies of men moving about, or heavy weights falling on them. Skirting boards are quite unnecessary for any properly constructed floors except for the purpose of ornament, to which these remarks have of course no reference.

The material of which floors are most commonly constructed is wood, but they may in certain cases be safely made of slate, or still more safely of brick or various kinds of concrete on supports which can resist the effects of heat. Stone is a very bad material for flooring, except when bedded on a foundation of solid earth, or some other fire-proof and non-conducting substance.

Circulation of air should on no account be permitted in any part of a building not exposed to view, especially under floors, or inside skirting boards or wainscots.

Good plaster protects wood and other inflammable materials from fire almost perfectly, and a sound pugging of plaster between the ceiling of a room and the floor of that over is practically found impervious to flame.

The floors of a building, of whatever material they are constructed, should be made both airtight and water-tight, and they would in this way resist the effects of heat much longer than if this precaution is omitted. They might with advantage even be caulked like a ship's deck, only with dry oakum without pitch.—*Fire Record.*

CROCKER BROTHERS, 32 Cliff Street, N. Y. METALS.

Anthracite Pig Irons,

COLD AND WARM BLAST CHARCOAL IRONS,

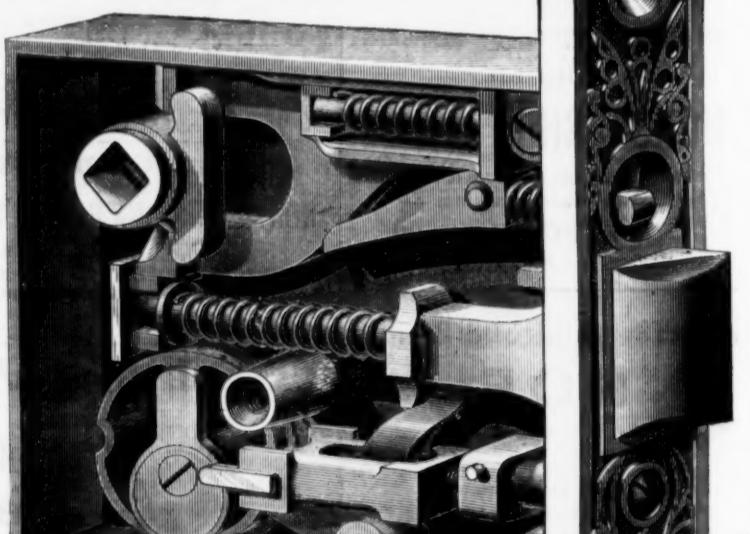
American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.

Yale Mortise Night Latch No. 70.

WITH CAP REMOVED SHOWING
INSIDE OF LOCK.



Yale Lock Mfg. Co.,

No. 298 Broadway, NEW YORK. STAMFORD, CT.

Empire.

Empire and Monitor Lawn Mowers

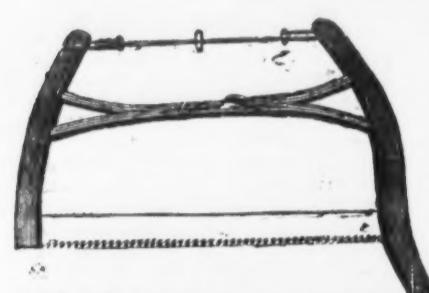
Have been before the public several years, and have given universal satisfaction. It is not necessary to make lengthy comments, only to say they are the lightest and strongest mowers in the market; also, for simplicity of construction, durability, and lightness of draft, they are acknowledged to be superior to any machines made. They are sold at *Panic* prices.
MONITOR, 15 in. cut, \$20.00
MONITOR, 10 in. cut, \$15.00
Agents wanted everywhere.
MANUFACTURED BY

BARLOW & WALKER, Sing Sing, N. Y.

Monitor.

GEORGE GUEUTAL & SON,
39 West 4th St., New York.
IMPORTER OF
Wood Screws, Steel in Sheets,
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,
MANUFACTURER OF
Saws of all kinds.
FACTORY, WILLIAMSBURGH, N. Y.



Elliptic Forked Saw Frame.
Patented June 25th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Brace being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webb, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURGH, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot.



Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of SPEED AND EASE, is manufactured by E. C. ATKINS & CO., Indianapolis, Ind., who are the SOLE MANUFACTURERS FOR THE UNITED STATES. So confident are we that this is the best Cross-cut Saw in the market that we CHALLENGE THE WORLD. Orders promptly filled. E. C. ATKINS & CO. Saw Manufacturers and Repairers, Indianapolis, Ind.

**Lloyd, Supplee & Walton,
HARDWARE FACTORS.**

MANUFACTURERS OF

**Bonney's Hollow
AUGERS.**

**Stearn's Hollow Augers
and Saw Vises**

**Bonney's Spoke Trimmers
Double Edge Spoke Shaves
Adjustable Gate Hinges
Scandinavian Pad Locks**

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.

**BILLINGS & SPENCER COMPANY, Manufacturers of
Clamp Lathe Dogs.**



And Hardened.
A First-Class Article, and something that every machinist and Tool Maker will appreciate.
WROUGHT IRON AND STEEL DROP FORGINGS
of every description. Machine Handles, Lathe Wrenches, Thumb Screws. Milling Machine Cranks, Spanners. Parts of Sewing Machines. Guns, Pistols, Drill Chucks, and MACHINERY GENERALLY.

TRADE MARK.
THE BILLINGS PATENT SEWING MACHINE SHUTTLE,
Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,
The Barwick and Wheatcroft

Patent Self-Adjusting PIPE WRENCHES, of all sizes.
Illustrated Circulars and Price List sent to any order on request.
Lawrence St., Hartford, Conn.

E. M. Boynton,
80 Beekman Street,
NEW YORK,
Manufacturer of

Saws of all kinds.
Also Sole Manufacturer of
LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, outlined on M tooth.

TELEGRAM DATED Oct. 1st, 1874.

STATE FAIR, EASTON, PA.

To HENRY DISSTON & SONS: Philadelphia, Pa.
I want you to publicly test that challenge on Cross Cut Saws. Name time and place within thirty days. American Institute preferred. E. M. BOYNTON.

E. M. Boynton gave on Wednesday of last week an exhibition of his Lightning Saw could do at the Pennsylvania State Fair, in which two men sawed through a sound oak log, 16 inches in diameter, in 17 seconds. Mr. Boynton informs us that his export trade is increasing, he having lately made large shipments of his saws to Australia and other distant markets.—*The Iron Age*, Oct. 8, 1874.

For fuller report of this exhibition see the *Eastern Morning Dispatch* of Oct. 1st, 1874.

Henry Disston & Sons cannot furnish Lightning Saws. Why do they imitate mine?

J. FLINT,
Manufacturer of
**ALL KINDS OF
SAWS**
And Plastering Trowels,
ROCHESTER, N. Y.

A large Stock of Cross Cut Saws constantly on hand. Orders filled promptly. Dietrich's Double Handle One Man Cross Cut Saw made with any kind of tooth desired. The newest method of grinding Hand Saws makes them superior to any in the market. Send for Illustrated Price List.



**Putnam's Government Standard
FORGED**

HORSE SHOE NAILS.

Manufactured from the best of NORWAY Iron, and warranted to give entire satisfaction.

**S. S. PUTNAM & CO.,
NEPONSET, MASS.**

**Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not batter or break. Wears itself sharp. Will last twice as long as any other Hoe, and is warranted to cut the "Bolles Hoe" or any Hoe in market.

For Sale at Manufacturers' Prices by
RUSSELL & ERWIN Mfg. Co., - - New York.
BYRNE & FITZSIMONS, - - - Albany, N. Y.
KENNEDY, SPAULDING & CO., - - Syracuse, N. Y.

A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

**A. PARDEE & CO.,
303 Walnut St.,
PHILADELPHIA'**

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves, and firms connected with us.

**A. Pardee & Co. HAZLETON,
CRANBERRY,
SUGAR LOAF**

**G. B. Markle & Co. JEDDO,
HIGHLAND.**

Pardee, Bro. & Co. LATTIMER,

OFFICES:

WM. LILLY, Mauch Chunk, Pa.

WM. MERSHON, Agent, 111 Broadway, N. Y.

WM. H. DAVIS, Agent, Easton, Pa.

**WHEELER, MADDEN
&
CLEMSON,**
Manufacturers of Warranted Cast Steel

SAWS

of every description,
including

Circular, Shingle, Cross Cut,
Mill, Hand, Roberts' and
other Wood Saws,
&c., &c.

Cast Steel Files

of the well known brand of

Wheeler, Madden & Clemson.

FACTORIES:

Middletown, Orange Co., N. Y.

BRANCH OFFICE:

97 Chambers Street, New York.

BRUNDAGE FORGED HORSE NAILS,
Manufactured from

BEST NORWAY IRON,
by BRUNDAGE & CO. Sold by
WHEELER, MADDEN & CLEMSON

Middletown, Orange Co., N. Y.

JAMES OHLEN
WARRANTED
PATENT ... GROUND
SECOND TO NONE
COLUMBUS, O.

I make a specialty of the LARGEST SIZES of Circular Saws, and call particular attention of lumber manufacturers to the following sizes of Circular Saws of Tempered Iron. The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the inner and outer annular rim, when the saw is removed remains perfectly true, which is proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no part shall have any work without due attention to this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run, and the importance of having the rim as to effect a tight fit in all its parts and at the same time RUN TRUE.

This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "Challenge" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

JAMES OHLEN.

V. G. HUNDLEY,
105 Beale St., N. Y.

NORTH CAROLINA HANDLE CO.,

(Wilson & Shober, Prop.)

Manufacturers of

**AXE, PICK, GERMAN & AMERICAN
SLEDGE, and other Handles.**

1 full assortment always on hand.

VAN WART, SON & CO.

Hardware Commission Merchants,
BIRMINGHAM, - ENGLAND,
Agents,

VAN WART & McCOY,
184 & 186 Diane Street, N. Y.

George H. Gray & Doforth,
48 India Street, Boston.

F. W. TILTON,
37 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for
John Rimmer & Son's Celebrated Harness and other Needles.

Agents for
Seydel's "Ashantee" Pocket Hammock

OSCAR IRVING VAN WART & CO.,
FORWARDING AGENTS,
2 South John Street, LIVERPOOL.

SCHOLEFIELD, GOODMAN & SON,
(Formerly JOSHUA SCHOLEFIELD & SONS.)

**GENERAL
Hardware Merchants,**
BIRMINGHAM, - ENGLAND.

Agents and Sample Rooms.

New York—Edward Frith, 16 Cliff Street.
Boston—H. L. Richards, 18 Battery-march,
Street.
New Orleans—H. Rhodes, 71 Camp Street.
Montreal—J. J. Evans 14 St., John Street.

JOHN MAXHEIMER,
Patented,

June 9, 1862; April 6, 1869;
Dec. 23, 1873; Jan. 20,
1874; Dec. 22, 1874.

Manufacturer of

**FULL SIZE OF
WIRE CONNECTION**

**JAPANNED and
PATENT EUREKA**

Bright Metal

BIRD CAGES.
Nos. 247 & 249 Pearl Street
NEW YORK.

H. CARTER,
290 PEARL ST., NEW YORK.

Moulders' and Plasterers' Tools.
Manufacturers of and Dealers in all descriptions of Moulders' and Plasterers' Tools, and Dealers in General Hardware, Glided Copper Weather Vanes, CARTER'S PATENT CARRIAGE LIFTING JACK, &c.

Backus's Patent Bit Brace

AND

**Angular Extension
BORER.**

Q. S. Backus,

SOLE MANUFACTURER OF

ANGULAR EXTENSION BORER.

Salesroom, 82 Chambers St., N. Y.

This tool can be used in any brace, at any angle, and also for straight work. Is the best and most convenient tool of its kind ever offered to the public.

Eight thousand sold the first year.

Also Manufactures the Straight Extension

Backus's Pat. Improved Bit Brace.

Section of Socket.

The socket is arranged so that the strain does not come on the jaws, but on the square hole which fits the shank of the bit. The jaws are fastened to the sleeve and hold it firmly. The sweep is of wrought iron. The general finish of the stock is good, and appears to be new. Mechanics who have used it unanimously pronounce it superior to others; and we offer it to the world, as the most convenient and quickest operating brace in the market. We manufacture five sizes. The number of inches of sweep corresponds with the commercial number of the bit.

Cutlery.

John Russell Cutlery Co.,

FACTORIES AND OFFICE,

TURNERS FALLS, MASS.

Manufacturers of

TABLE CUTLERY,
Butcher, Painters' and Druggists' Knives

IN GREAT VARIETY.

Extra Hard Rubber Handle Table Cutlery of our own Manufacture.

Fine Ivoride Handle Table Cutlery, very White and Durable.

Sample Office, 77 Chambers St., N. Y.

NORTHAMPTON CUTLERY CO.,

Manufacturers of all kinds of

American Table Cutlery,

Cook, Butcher, Shoe and Hunting Knives.

Sole Agents for Rogers' Cutlery Co.

Plated Forks and Spoons.

D. P. GRIFFITH, Manager, 45 Murray Street, N. Y.

FRIEDMANN & LAUTERJUNG,

MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors, Russia Leather Straps, Oil and Water Hones, &c.

Sole Proprietors of the renowned full concaved patent

"ELECTRIC RAZORS."

Also Agents for the BENCALL RAZORS.

American Table Cutlery, Butcher Knives, &c.

14 Warren Street, NEW YORK.

423 N. Fifth Street, ST. LOUIS, MO.

TABLE KNIVES AND FORKS OF ALL KINDS,

AND EXCLUSIVE MAKERS OF



And the "Patent Ivory" or Celluloid Knife. These Handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

PATENT FINE PEN & POCKET CUTLERY

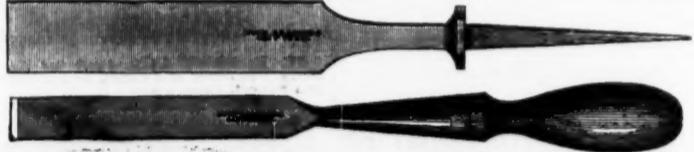
WEST MERIDEN, CONN.

The only Knives made that are put together in such a manner that there is no strain on the cover or frail part of the knife. We warrant our knives in cutting qualities and workmanship as any made, and are acknowledged by English makers as the Best American Knife. We also make

NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory or by

J. CLARK WILSON & CO., 81 Beckman Street, N. Y.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

PLANE IRONS.

Gouges of all lengths, and circles beveled inside or outside. Nail Sets, Scratch and Belt Awls, Chisel Handles of all kinds. Orders filled promptly; generally same day as received.

The American Ice Chisel



Is superseding all others. It will save your time, save your ice, save your refrigerator, save your money. It shaves more rapidly than a Crusher, and splits as true as a saw. The blade is of the best English Steel, carefully tempered and plated to prevent rust.

Address orders,

THE AMERICAN ICE CHISEL,

100 Chambers Street, or P. O. Box 1402, New York.

ESTABLISHED 1858.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

WALKILL RIVER WORKS,

Walden, Orange Co., New York.

THOS. J. BRADLEY, President.

AMERICAN PEN AND POCKET KNIVES,

MANUFACTURED BY PEPPERELL.

Aaron Burkinshaw, AB MASSACHUSETTS

My blades are forged from the best Cast Steel, and

warranted. To me was awarded the Gold M. & A. of the Connecticut State Agricultural Society; also a Medal and Diploma from the New Mechanics' Ass'n Sept. 1850

Wood's Hot Water-Proof Table Cutlery.

Handsome, Cheapest, most Durable Cutlery in use.

Wood's Celebrated Shoe Knives, Butcher

Knives a specialty.

WOODS CUTLERY CO., Antrim, N. H.

CLARK WILSON & CO., Agents, 81 Beckman St., N. Y.

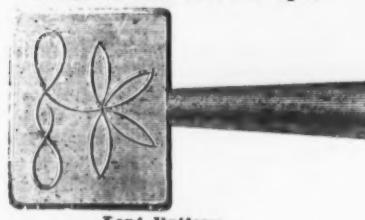
Established 1858.

Illustrated Catalogues sent on application.

Illustrated Catalogues sent on application.</div

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



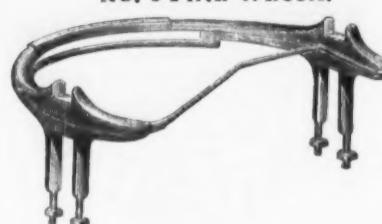
Leaf Pattern.

King Bolt Yokes.



Established 1850.

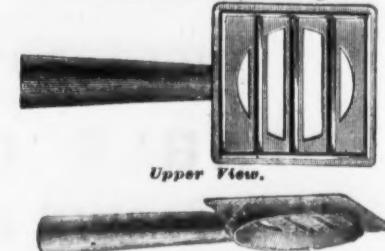
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



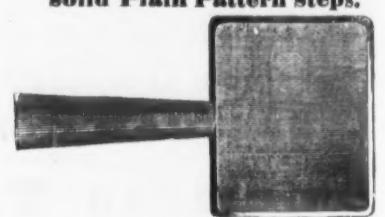
Patent Cross Bar Steps.



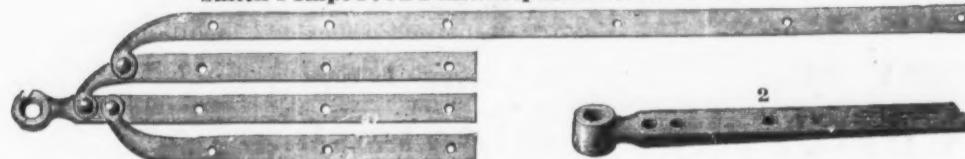
Upper View.

Lower View.

Solid Plain Pattern Steps.



Smith's Improved Philadelphia Pattern Slat Irons.



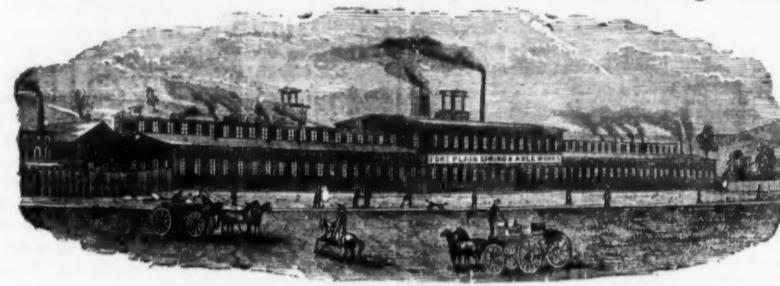
MANUFACTURERS OF A LARGE VARIETY OF FIRST-CLASS

FORGED CARRIAGE IRONS.

Send for Price List.

FORT PLAIN SPRING & AXLE WORKS CLARK, SMITH & CO.,

Green Jacket Axles. FORT PLAIN, N. Y. Fine Carriage Springs.

MANUFACTURERS OF
English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,
by Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE
COLLAR to the FINEST OF STEEL.Our facilities for manufacturing are very extensive, and with our recent additions of new and improved
hinery, we defy competition.

Send for Price List and Descriptive Circular.

CARRIAGE BOLTS.

Buy the Best.

Clark's Patent
Carriage Bolt.Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not
turn in its place.

MANUFACTURED BY

CLARK BROS. & CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, &c.
Send for Illustrated Price List

WILSON MANUFACTURING COMPANY., NEW LONDON, CONN.

MANUFACTURERS OF

SOLID BOX VISES.

With or without Convex and Concave Washers.
Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp
Heads and Screws; Parallel Bench Vises, Sash Pulleys, Ho
House Pulleys, Composition Clocks, Bench Screws, Vise Screws
Gridirons, Drill Stocks and Bows, Box Chisels, Rivets,
Sheaves, Block Pins, Composition Roller and Iron Bushings,
Riggers' Screws, Cawlers' Tools, Pump Chambers, Belaying
Pins, Martin Spikes, Malleable Iron Castings, and General
Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,
Warehouse, 37 Chambers St., N. Y.

HOOPES & TOWNSEND,

Manufacturers of

MACHINE & CAR BOLTS,

Cold Pressed Square & Hexagon Nuts,

Washers, Rivets, Wood or Lag Screws, Chain Links, Truck and Car Forgings,
Bridge Bolts, Bridge Forgings.

IRON AND RODS FOR BUILDINGS.

1330 Buttonwood Street,

PHILADELPHIA.

CONCORD SPRING WORKS, J. PALMER & CO.,

Manufacturers of

CARRIAGE SPRINGS, Superior Temper, Warranted.

CONCORD, N. H.

Philadelphia Star Bolt Works.

"STAR"

Carriage and Tire Bolts,

NORWAY IRON,
Button Head.Carriage and Tire Bolts,
CHARCOAL IRON,
Beveled Head.

Trade Mark.

QUALITY GUARANTEED.

IXL

Carriage and Tire Bolts,
QUALITY UNSURPASSED.

The Celebrated "STAR" Brand of Axle Clips.

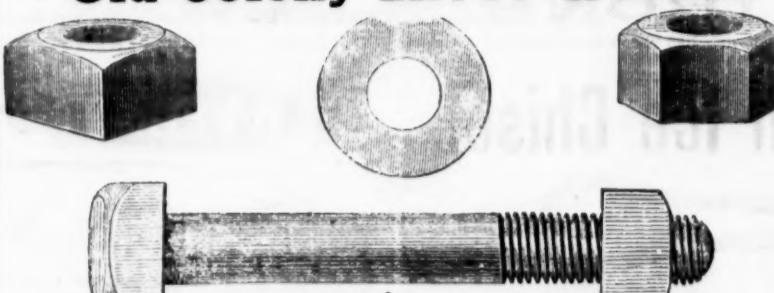
Blank Bolts, Wood Screws, Square Head Bolts, Plow Bolts, &c., &c.

Our IXL

Bolt is made from approved brands of Iron, and is equal in every
point of appearance to the regular Philadelphia Carriage Bolts, being made on the same machinery, and
the quality is not surpassed by any bolt of like grade in the market.

TOWNSEND WILSON & HUBBARD 2301 Cherry St. Philadelphia Pa.

Old Colony Rivet Works.

Rivets, Nuts, Washers, Lag Screws, Coleman's Eagle Carriage and
Tire Bolts, Axle Clips, Felloe Plates, Shaft Couplings, Stove
and Machine Bolts, Drilling Machines, Tire Benders,
&c. Full stock constantly on hand.

Warehouse, 116 Chambers St., N. Y.



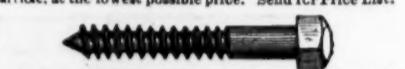
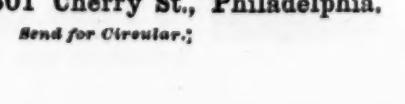
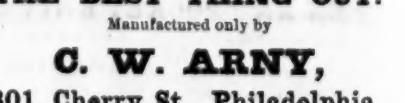
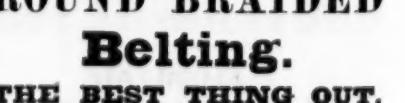
Manufacturers of

Carriage, Tire & Square Head
Bolts.Cold Pressed Nuts and Washers, Etc.,
YOUNGSTOWN, OHIO.

Price lists sent on application.



THE READING BOLT & NUT WORKS.

J. H. STERNBERGH,
READING PA.,Manufacturer of all kinds
Machine Bolts, Bolt Ends,
RODS for Bridges & Buildings,
HOT PRESSED NUTS,Washers, Coach Screws, Refined Iron, &c.,
Manufacturing my own stock of iron. I am able to equal
quality, and fill orders promptly, with a very superior
article, at the lowest possible price. Send for Price List.H. H. NEWHALL, Agent for New England
States, New Jersey and Eastern New York, 11 Warren
Street, New York.Alexander Brothers,
Manufacturers of OAK TANNED

Leather Belting

410 & 412 North 3d, Philadelphia, Pa.

Faught's Patent

ROUND BRAIDED

Belting.

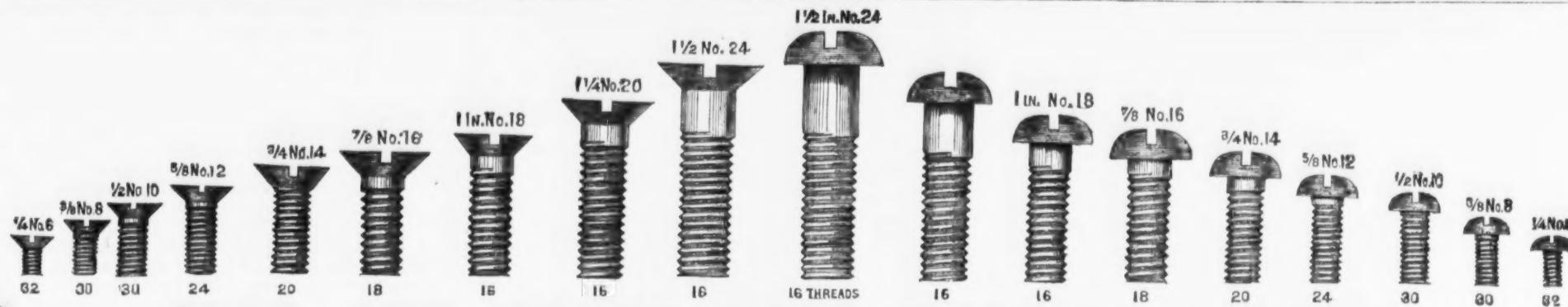
THE BEST THING OUT.

Manufactured only by

C. W. ARNY,

301 Cherry St., Philadelphia,

Send for Circular.



FLAT AND ROUND HEAD MACHINE SCREWS,

OF SIZES, Nos. - - 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, SCREW GAUGE.
AND LENGTHS - - 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2 INCH.

PLUG AND BOTTOMING TAPS.

Manufactured, KEPT IN STOCK, and sold by

AMERICAN SCREW COMPANY, - - PROVIDENCE, R. I.

Fillister Head and Pattern Machine Screws Made to Order Promptly.

11 Warren Street, New York.

H. B. NEWHALL,

Agent for the Following Companies:

PROVIDENCE TOOL CO., - - Providence, R. I.
Heavy Hardware, Ship Chandlery and Clothes Wringers.

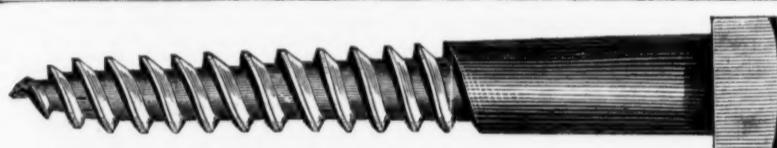
WM. H. HASKELL & CO., - - Pawtucket, R. I.
Machine Bolts and Coach Screws.

LEWIS, OLIVER & PHILLIPS, Pittsburgh, Pa.
Heavy Hardware and Railroad Supplies.

ROCHESTER MACHINE SCREW CO., Rochester, N. Y.
Milled Set and Cap Screws.

PENFIELD BLOCK WORKS, - - Lockport, N. Y.
Rope and Iron Strapped Tackle Blocks.

ADAMANTINE FILE WORKS, - - Providence, R. I.
Hand Made Files. Trade Mark "Philo, Sheffield."



WM. H. HASKELL & CO.,

Pawtucket, R. I.

Manufacturers of

COACH SCREWS (with Gimlet Point),

all kinds of

Machine and Plow Bolts,

FORGED SET SCREWS AND TAP BOLTS.

Warehouses, 11 Warren St., N. Y.; H. B. NEWHALL Agent.

To all Manufacturers who use Emery for polishing Iron and Steel Goods, and for the manufacture of Polishing and Cutting Wheels, and other purposes.

CORUNDUM

FROM THE UNIONVILLE MINE, Chester County, Pa.,

Manufactured by the

PENNSYLVANIA CORUNDUM COMPANY.

Are now prepared to furnish a very superior quality of Genuine Corundum, from the Unionville Mine, Chester County, Pa., which is the largest known deposit of Corundum in the world. It is harder than Emery or any other known Mineral except the "Diamond," and superior in its cutting qualities for the polishing or cutting of steel, iron or other hard substances for which Emery has been used.

JAMES C. HAND & CO.,
COMMISSION MERCHANTS,
No. 614 & 616 Market Street.

PHILADELPHIA.

GEORGE S. FALES,

SUCCESSOR TO
FAIRBROTHER & FALES,
Sole Owner and Manufacturer of

Page's Patent Lace Leather,

And Manufacturer of

OAK BELTING,

Also, Pickle or Moccasin Leather, for Boot and Shoe Packs.

Angular Belting and Pulleys made to order.

PAWTUCKET, R. I.

Ask for Star Stamped Lace Leather.



AMERICAN BOLT COMPANY,

MANUFACTURERS

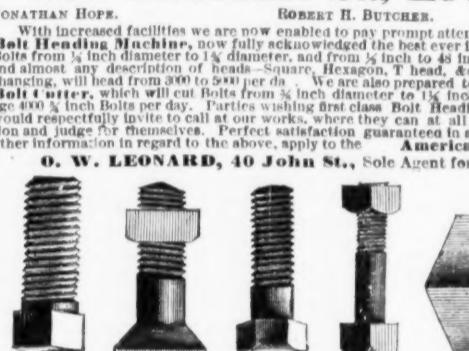
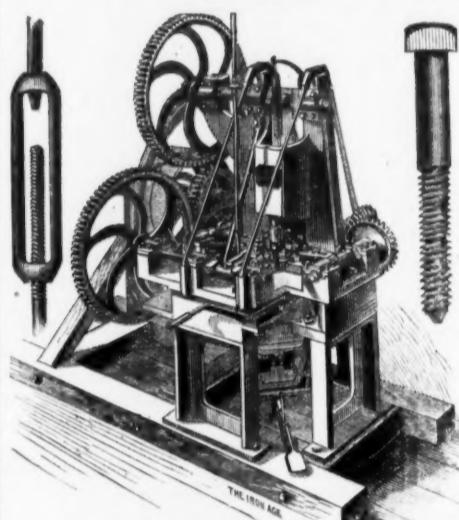
BOLTS AND NUTS.

Coach or Lag Screws, Washers, Chain Links, Forgings, &c.
OF ALL KINDS AND SIZES, AT SHORT NOTICE.

210 Lawrence St., Lowell, Mass.

JONATHAN HOPKINS, ROBERT H. BUTCHER, JAMES MINTER
With increased facilities we are now enabled to give prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machine will turn and almost any description of heads—Square, Hexagon, T head, &c. and properly attended, without cleaning, will turn 1000 bolts per hour. We are also prepared to offer for sale our New Patent Bolt Cutter, which will cut Bolts from 1/4 inch to 1 1/2 inches in diameter, and from 1/4 inch to 48 inches long, or longer if necessary. Persons wishing to have their Bolts cut, or to have them heading, may have them sent to us, and we will receive and turn them in 4000 1/2 inch Bolts per day. Persons wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully invite to call at our works, where they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For references and any other information in regard to the above, apply to the American Bolt Co., Lowell, Mass.

O. W. LEONARD, 40 John St., Sole Agent for New York and vicinity.



TACKS & SHOE NAILS, Upholstery, Gimp, Brush, Card & Pail Tacks,

Leathered, Tinned and Large Head Iron Carpet Tacks, Finishing Nails made expressly for black walnut work, Clout and Trunk Nails, black or tinned, warranted to clinch.

Hungarian, Cigar Box and Chair Nails, Boat Nails of Copper or Iron.

Zinc, Copper, Steel and Iron Shoe Nails, Slating and Roofing Nails, 3d and 2d Fine Nails, Roofing Tacks Brads, Patent Brads, Dowel Brads for cabinet makers' use, etc., etc.

Any Size or Style of Tack or Nail made to sample. TINNED TACKS AND NAILS of every variety.

MADE BY THE

AMERICAN TACK COMPANY,

SALESROOM, 117 Chambers St., N. Y.

The EUREKA "Perfected"
SELF-ADJUSTING



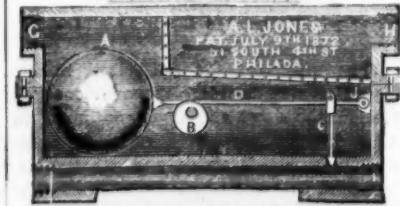
Simplest, Best and Cheapest Clothes Wringer in the World.

Steel Elliptic Springs.

T. J. ALEXANDER,
General Agent and Manager,

Office, Oliver St. cor. High, Boston, Mass.

Patented July 9th, 1872.



PATENT IMPROVED STEAM TRAP

The only self-regulating Steam Trap in the world. For full description send for circular to

A. L. JONES,

Steam Heating Establishment, 51 S. 4th Street, Phila.



(ESTABLISHED 1845.)

No. 2030 Arch St., PHILADELPHIA.

THE ORIGINAL AND ONLY ESTABLISHMENT MANUFACTURING THE

Genuine Eagle Bolt.

AND USING SQUARE NORWAY IRON EXCLUSIVELY.

Carriage Bolts of every description, Pointed Tire Bolts, Square Head Bolts, Countersunk Bolts, Cone Heads, Steeple Heads, T Heads, Cheese Heads, Elliptic Heads, Step Bolts, Axle Clips, Turned Collars, California Tire Rivets and Washers constantly on hand, and orders filled promptly.

IMPROVED "EAGLE" BED SCREWS.

For Price Lists and Discounts, Address

THE M. J. COLEMAN BOLT AND NUT COMPANY,

(Successors to M. J. COLEMAN,) No. 2030 Arch Street, PHILADELPHIA.

A complete assortment at OLD COLONY RIVET WORKS, 116 Chambers Street, N. Y.

The Iron Age.

New York, Thursday, March 11, 1875.

DAVID WILLIAMS - *Publisher and Proprietor.*
JAMES C. BAYLES - *Editor.*
JOHN S. KING - - *Business Manager.*

NEW YORK, January 2, 1875.

Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents.

Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

Our rates of subscription will therefore be as follows:

Weekly Edition.....\$4.50 a year.
Issued every THURSDAY Morning. Contains full Trade Reports for the week, brought up to the close of business on the previous day.

Semi-Monthly Edition.....\$2.30 a year.
Issued the FIRST and THIRD THURSDAY of every month. Contains a full Review of the Trade for the previous half month.

Monthly Edition.....\$1.15 a year.
Issued the FIRST THURSDAY of every month. Contains a full Review of the Trade for the previous month.

To Foreign Countries.

	Including Postage.		
	Weekly.	Semi-Monthly.	Monthly.
Canada	\$4.50	\$3.30	\$1.15
Great Britain	6.00	3.60	1.75
France	7.00	3.60	2.00
Germany	7.00	3.60	2.00
Prussia	8.00	4.00	2.00
Buenos Ayres	8.00	4.00	2.00
Pern	6.00	3.00	1.50
Belgium	8.00	4.00	2.00
Mexico	6.00	3.30	1.65
Sweden	8.00	4.00	2.00
New Zealand	8.00	4.00	2.00
Brazil	6.00	3.30	1.65

ADVERTISING.

One square (12 lines, one inch), one insertion, \$2.50; per month, \$7.50; three months, \$15.00; six months, \$30.00; one year, \$40.00; payable in advance.

All communications should be addressed to
DAVID WILLIAMS, Publisher,
10 Warren Street, New York.

EUROPEAN AGENCY.

CHARLES CHURCHILL & CO., American Merchants, 29, Wilson Street, Finsbury, London, England, will receive subscriptions (all postage prepaid by us) at the following prices in sterling: Great Britain, 25.; Germany, Prussia and Belgium, 33/4; Sweden, 50. They will also accept orders for advertisements, for which they will give prices on application.

City Subscribers will confer a favor upon the Publisher, by sending at this office any delinquency on the part of carriers in delivering *The Iron Age*, also the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hallways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

CONTENTS.

First Page.—The Late E. B. Ward, of Detroit. An English Master on the Iron and Steel Industries of the United States.

Third Page.—Speiser. History of a Trade Union. The Manufacture of Malleable and Gray Iron Castings at Phillipsburg, N. J.

Fifth Page.—Hammered Work in Sheet Metal. North Georgia Iron Ore.

Seventh Page.—Fuel Economy in the Puddling Process. A Cincinnati Bolt and Screw Factory.

Ninth Page.—Business Items. Floor Construction.

Eleventh Page.—Philadelphia Correspondence. Coke in Anthracite Furnaces. James B. Neilson, Inventor of the Hot Blast.

Fourteenth Page.—The Business Outlook. Marine Diseases in 1874. Iron Ores for the Centennial Exhibition. The Anthracite Coal Troubles. The Statistical Position of Tin.

Fifteenth Page.—Ores for the Centennial. The Law of Patents. A Burning Gas Well in Pennsylvania.

Seventeenth Page.—Dense Castings. Great Corporations. Automatic Gas Lighter.

Nineteenth Page.—Emery. Architectural Iron Work in Richmond, Va.

Twenty-first Page.—An Injunction Against Car Manufacturers. American Graphite. International Exhibitions.

Twenty-first Page.—Trade Report.

Twenty-second Page.—Trade Report.—(continued).

Twenty-third Page.—Our English Letter.

Twenty-seventh Page.—The Iron Age Directory.

Twenty-eighth Page.—Plumbago Crucibles.

Thirty-first Page.—New York Wholesale Prices of Hardware and Metals.

Thirty-first Page.—New York Wholesale Prices (concluded).

Thirty-fifth Page.—Philadelphia, Buffalo, Cincinnati, Pittsburgh and Detroit hardware and Metal Prices.

Thirty-seventh Page.—Chicago, Boston, and St. Louis hardware and Metal Prices.

The Business Outlook.

During the past few weeks there have been many indications which, in the absence of any definite assurances concerning the future, warrant the hope that we are about to witness the beginning of a healthy and sustained recovery of general business from the long protracted inactivity which succeeded the prostrating effects of the panic. How far this will go toward insuring us an average spring trade remains to be seen, but the opinion is generally entertained in well informed business circles that we have passed the turning point, and that everything is steadily tending in the direction of a return of general industrial and commercial activity. The facts upon which this opinion is based may be

briefly stated as follows: Stocks in retailers' hands are unusually small; the wants of consumers, which are large in proportion to the economy of consumption which has been observed by all classes of the community since the fall of 1873, must be supplied or, more properly, anticipated by the purchase of large and well selected stocks of manufactured goods of all kinds for the retail trade. There is no tendency toward speculative activity. During the past year and a half there has been a steady progress in liquidation, and it is probable that the amount of indebtedness between retailers, jobbers and manufacturers is smaller now than at any time for several years. Whatever business is done this spring is very sure to be done upon a safe basis, for confidence is not yet so fully restored that any class of producers or distributors will risk any bold ventures. Certainly there is little danger of overtrading this spring. Prices are now very nearly down to gold figures, and wages have declined, with but little prospect of soon advancing to the high rates paid since the war. We have not discovered any disposition on the part of buyers in any of the principal markets to delay purchases on account of any uncertainty as to the future of prices, nor any anxiety on the part of manufacturers or dealers to press sales on that account. The jobbers in cities from which the supplies of retailers in the agricultural districts are chiefly drawn are buying with as much freedom as in times of general prosperity, and with the advance of the season we may expect to witness the development of a spring trade which, if it does not realize all the expectations which have been formed, will at least prove satisfactory to the majority of tradesmen.

As to the iron market, there is little to warrant the belief that it will share in any marked degree the immediate benefits of an improvement in general trade. An advance in the price of pig iron great enough to appreciably benefit makers would probably lead to the blowing in of furnaces enough to over supply the market, and force prices down again to, or below, the cost of production. The long hoped for improvement in this trade will be brought about gradually. With a renewal of activity in general manufacture we shall have an increased consumption of manufactured iron in all forms, but the demand of the railroads, to meet which our iron industries were expanded to so great an extent during the ten years ended with 1873, will be limited for a considerable time to come. Legislative tampering with questions connected with transportation—particularly with railway management and railway tariffs—has rendered capital timid. It will not risk investment in enterprises which, when completed, can be made subject to "Potter laws," or enactments of like character and purpose. Capitalists will not build railroads which are to be managed, when completed, by the hayseed statesmen of the Grangers who control legislation in so many of the Western States, or by convention orators and office seeking demagogues who form the rank and file of the "cheap transportation associations" in States where Grangers are powerless. There is, moreover, considerable uncertainty as to what the national government may attempt or accomplish in the exercise of the power which has been claimed for it under Art. 3 Sec. 8 of the Constitution, and so long as this uncertainty exists so long will our progress in railroad building be less rapid and general than it would be were capital assured of immunity from legislative interference. In the course of an address lately delivered by the Marquis of Salisbury before the Manchester Chamber of Commerce, the philosophy of this whole question was so clearly and concisely stated that we cannot do better than quote the language of the eminent British Statesman: "Capital will go, as we well know, to any part of the world. It will face any difficulties and dangers in seeking employment. But there is one thing which frightens it back, and that is any great uncertainty as to the conditions under which it is to be employed. If it knows the worst, it can adapt itself to the worst; but if there is the probability of some great change of uncertain scope and import, upon which some attach a large importance and some a small importance, the calculations become altogether so uncertain that no man of capital likes to risk his money in the venture." This is an elementary truth which those who make laws for the regulation of railroads would do well to remember.

Marine Disasters in 1874.

The Bureau Veritas, in its annual report of losses at sea in 1874, places the total number of sailing vessels and steamers lost during that year at 2268. The number of sailing vessels was 2093, representing the merchant fleets of every maritime nation.

The following is a comparison of the losses of sailing vessels for a number of years:

	No. vessels.
During 1874.	2,093
During 1873.	2,165
During 1872.	2,082
During 1871.	2,426
During 1870.	2,313
During 1869.	2,453

There is a curious coincidence in the uniformity of the totals for the years given. The annual average for the five years is 2355, and from this the number varies but little either way in any year. The total for 1872 is the largest of any, and when we take into account the increased number of vessels afloat, it will appear that the percentage of loss is diminishing. But it is still alarming to think how great a fleet goes to the bottom or is broken up on shore every year.

Of steamers, the following totals of losses are given: 1870, 179; 1871, 175; 1872, 244; 1873, 187; 1874, 175. All the maritime powers, great and small, are represented in the list. Great Britain is proportionately a heavier loser than any other nation. Her "cheap ships," which so many Americans have manifested a desire to buy, and with which we were promised the restoration of our merchant marine, are, as the rule, less seaworthy in proportion to their number and tonnage afloat than those of any other nation. The percentage of British iron steamers annually lost is very large, and the revelations made by Mr. Plimsol, M. P., not long ago, show that British ship owners are not more scrupulous than British ship builders. We can and do build better ships in this country than are built in England, especially iron ships, and experience is showing that, all things considered, they are as much cheaper as they are better, even though the first cost is somewhat greater.

Iron Ores for the Centennial Exhibition.

We print on another page of this issue a circular letter signed by Hon. Daniel J. Morrell, Chairman of the Committee of the American Iron and Steel Association having in charge the work of collecting iron ores for exhibition at the Centennial, in which is set forth the plan of operations agreed upon for the furtherance of the work. This is simply the solicitation of voluntary contributions of money and samples of ores, and those who make such contributions are assured that they will thus be relieved of all trouble concerning the proper exhibition of the ores and fuels in which they are interested. When the Committee know what support they can expect in the matter of voluntary contributions, they will mature some plan by which they hope to insure the success of the work.

With all respect for Mr. Morrell and his associates, we think this is little better than trifling with a subject which has been trifled with too long already. Were they to receive all the assistance and co-operation which the most sanguine of them could expect, they would not have time to complete the work they have undertaken in a manner which would be at all satisfactory to themselves or the public.

In the year which remains, the work can only be done satisfactorily and thoroughly by the several States, and we would earnestly advise the committee of the Iron and Steel Association to bend every energy

to induce the State governments to appoint commissioners to collect, analyze, and classify ores and forward such collections to Philadelphia where, the Iron and Steel Association can take charge of them. We have no time for any more unsuccessful experiments of any kind, and the plan of voluntary contributions adopted by the committee cannot, we think, possibly succeed. If we are to have an exhibition of ores at the Centennial that shall be any respect national, or from which a correct and comprehensive idea of the coal and iron resources of the country can be obtained, each State must do the work for itself. If such co-operation cannot be secured, the project might as well be abandoned now as later. To prepare the ores for exhibition after they are collected, condense the various reports which would be sent in with them, and direct the preparation of the maps and charts which will be needed to show the geographical distribution of ores and coals over the whole country, will be quite as much as the committee of the Iron and Steel Association can do.

The Anthracite Coal Troubles.

The strike of the Schuylkill miners is occasioning serious inconvenience to the furnaces which have continued in blast in the hope of a return of general industrial activity and a better demand for iron. A considerable number of those which have continued blowing up, to the present time will have to blow out, unless the experiment of using Western coke should prove successful. As will be seen from statements made in other

columns of this issue, several of the furnaces are using coke in admixture with anthracite. A correspondent informs us that the superintendent of the Pennsylvania Steel Company's furnaces is now using one quarter coke, until certain alterations in the machinery operating the hoists can be made, by which they can be worked with a reduced blast, when he will use one-half coke, or all coke, if necessary. The coke is delivered on cars in Westmoreland county at 3 cents per bushel or \$1.50 per net ton. The freight to Harrisburg and adjacent points is \$2.60 per ton, making the cost at furnace \$4.10 per ton. The cost to furnaces on the Schuylkill is about \$5. The experiment has not yet been tried long enough, or under conditions sufficiently favorable to determine the comparative economy of anthracite and coke, or the effect of substituting the one for the other in an anthracite stack will have upon the character of the iron made. When this has been determined we hope to acquaint our readers with the result. There is some doubt expressed by practical men whether the shape of anthracite furnaces will admit of the use of coke with advantage. The successful coke furnaces are so constructed as to accommodate the rapid expansion of the fuel which takes place as soon as it becomes hot. The gradual downward enlargement of the anthracite stacks may not allow this expansion to take place. Whether this is so or not, must be determined by practical tests.

For furnaces which are not prepared to try this experiment, and which have no stocks of coal on hand, there seems to be but one alternative. The Philadelphia and Reading Coal Company lately gave notice to the furnace owners along the line of the Reading Road that their stock of coal at Port Richmond, of which large quantities had been sent back over the road almost to the mines, was so nearly exhausted that it would not last much longer, and it now has not a ton of furnace coal on hand. When the strike began they had in stock 10,000 tons lump, 15,000 tons steam coal, and 20,000 tons of smaller sizes, all of which has been sold for consumption, together with 5000 tons, or more, of Wyoming Valley coal. Supplies from this source are now cut off, owing to the successful efforts of the Schuylkill miners to secure the co-operation of those in the Wyoming Valley, and those dependent upon the Reading Company for coal must do without it for the present. The furnaces along the Lehigh and Upper Susquehanna are supplied from the Wyoming mines, but the operators, who have the miners under present control, are directing their efforts to the accumulation of a surplus stock, and will not allow any considerable amount to be diverted to other sections. At last advices there was no prospect of a settlement being reached by compromise, and neither side is ready to yield the contest and meet the other's terms.

The Statistical Position of Tin.

We print on another page of this issue a circular letter signed by Hon. Daniel J. Morrell, Chairman of the Committee of the American Iron and Steel Association having in charge the work of collecting iron ores for exhibition at the Centennial, in which is set forth the plan of operations agreed upon for the furtherance of the work. This is simply the solicitation of voluntary contributions of money and samples of ores, and those who make such contributions are assured that they will thus be relieved of all trouble concerning the proper exhibition of the ores and fuels in which they are interested. When the Committee know what support they can expect in the matter of voluntary contributions, they will mature some plan by which they hope to insure the success of the work.

The Statistical Position of Tin.

In an article published in our issue of January 28th, we gave the statistical position of tin in Europe at the close of last year, and are now able to compare it with the statistics of February 1:

THE VISIBLE SUPPLY OF TIN.						
1874.	1873.	1872.	1871.	1870.	1869.	1868.

Boston amounted to but 9000 bales; this year we shall get 25,000 bales, and the increasing traffic in that article may start a direct tin trade. The Australians have since begun to imitate, in weight and shape, Straits' slabs. We do not see why both the Australian producer and American importer or consumer should not strive to establish direct relations, rather than permit recast tin of Australian yield to be palmed off upon us for English refined at a higher price. But however this may be, the immediate and remoter future of tin values is shrouded in uncertainty as much as ever, even at the great reduction effected by the causes we have endeavored to elucidate. Recent letters from London express the apprehension that a further considerable drop may be impending, unless consumption continues to develop as healthily as it did during the, in other respects, rather dull month of January. The statistics of March 1, which will soon be at hand, will possibly enable us to form some judgment in this respect. The rapidity with which Straits tin reaches London by steamer *sia* the Isthmus of Suez, has, we may add, disconcerted European statisticians not a little.

Ores for the Centennial.

Our readers have already been informed that the American Iron and Steel Association, having failed to carry out its original plan for the collection and classification of iron ores for the Centennial Exhibition, have adopted a new plan, which is set forth in the following circular letter:

Office of the American Iron and Steel Association, No. 265 South Fourth Street, Philadelphia, March 1st, 1875.

Mr. Daniel J. Morell, Chairman of the Centennial Commission, referred the task of making a collection of iron ores, fuels, fluxes and refractory materials to the American Iron and Steel Association, as the most representative of the iron trade of the country. The commission suggested that "a fund be raised by private subscription to defray the inevitable expense of the collection of ores, and placed in the hands of the Treasurer of the American Iron and Steel Association." The association accepted this trust, and last year organized a scientific board to hold its meetings in Philadelphia and in connection with the officers of the association. This plan was, however, abandoned, owing in part to the extreme depression of the iron business, and in part to doubts whether, after the refusal of Congress to make an appropriation in its behalf, there would be an exhibition. The association has now taken action in the direction of seeking the aid and co-operation of its own members, both to contribute a sufficient sum to defray the cost of gathering and exhibiting a proper collection of the iron ores of the entire country, and to lend all convenient assistance in contributing specimens from their own mines. In accordance with this plan, the association, at the meeting held in Philadelphia, February 11th, 1875, adopted the following resolution:

"Resolved, That the president appoint a committee of seven members of the association whose duty it shall be to take such measures as may be necessary to secure a proper display at the Centennial Exhibition of iron ores and fuels and iron and steel products, the said committee to have the power to collect funds and to employ suitable expert assistants."

The President appointed the following gentlemen to act as said committee:

DANIEL J. MORELL, Johnstown, Pa.
W. E. COXE, Reading, Pa.
ANDREW CARNEGIE, New York.
JOSEPH WHARTON, Philadelphia.
WM. FIRMFEST, Easton, Pa.
JAMES I. BENNETT, Pittsburgh, Pa.
FAYETTE BROWN, Cleveland, Ohio.

The committee has held one meeting, at which it was resolved to take immediate steps to carry into effect the object for which it was appointed. At this meeting the active co-operation of Mr. J. B. Pearce, of Philadelphia; Mr. Galloway C. Morris, of Philadelphia; Mr. Z. S. Durfee, of New York, and others, was promised. Arrangements were made to begin work at the earliest practicable moment.

Having therefore organized and begun work, the Committee appeals to all persons in the trade throughout the whole country, whether members of the Association or not, to support it liberally in the task of making a connected, useful, and creditable exhibition of the iron resources of the country. The sum of \$15,000 is estimated to be the least that will defray the inevitable office and storage expenses, the expense of construction of cases and arranging collections on the most economical scale, etc. Parties contributing money and collections will thus relieve themselves of all trouble concerning the proper exhibition of their ores and fuels, and at the same time aid in securing the success of the exhibition. It is desirable that all parties or firms who intend to exhibit shall at once communicate with the Chairman of the Committee. When we ascertain the support we are likely to receive, and the sections from which it is drawn, we can announce a definite plan and request attention to proper specifications in regard to the character of the collections to be forwarded.

We have in this country a boundless wealth of iron ore and coal, and every owner and manufacturer is equally interested in gaining a correct idea of the comparative character of the deposits of all sections, and in convincing foreigners and our own citizens of the value of particular localities. The interests furthered by such an exhibition are vital and take the widest range. In the home manufacture, the question of transportation will be exemplified by full exhibits of the ores of given regions, with data concerning their shipment, and interesting facts will be brought out concerning the quality of the products made from them. It cannot be expected that another opportunity will occur in this generation at all comparable to this for inviting the attention of foreign capitalists, or of those desiring to increase their ore supply, nor for impressing upon our fellow citizens who are not interested in iron the immense importance of this industry and the consequent necessity of promoting its welfare by wise legislation. Let every one respond promptly, according to his ability, and we will show, as has never yet been shown, how large and vital is the interest we represent. Now is the time, and it will be no excuse to say that doubts of any kind prevented any one from timely action. The success of the exhibition is now certain, the buildings are well under way, and the first great national opportunity is now offered to the iron trade of America to prove its greatness and its energy.

Checks should be drawn payable to the order of Charles Wheeler, treasurer.

All letters should be addressed to me, until further notice, at the office of the American Iron and Steel Association.

By order of the Executive Committee.

DANIEL J. MORELL, Chairman.

The following correspondence between Mr. J. Blodget Britton and Mr. James M. Swank, of which Mr. Britton has favored us with a copy, will serve to explain why the scientific commission, appointed in January, 1874, never did anything and, indeed, never met for organization. We print the correspondence as an act of justice to Mr. Britton and the gentlemen who were invited with him to serve upon the commission:

THE IRON MASTERS' LABORATORY,
No. 339 WALNUT STREET,
PHILADELPHIA, Jan. 21, 1875.

JAS. M. SWANK, Esq., Sec'y Am. I. & S. Ass.—DEAR SIR: About a year ago I accepted an appointment upon the scientific board suggested by your association for the collection, classification, and exposition of American iron ore at the Centennial Exhibition, proposed by Dec. 3, 1872, to the Hon. Daniel J. Morell. What has your association done since done in the matter, and what does it propose to do? Will you please inform me? Yours very truly,

J. BLODGET BRITTON.

OFFICE OF THE AMERICAN IRON AND STEEL ASSOCIATION, No. 265 SOUTH FOURTH STREET, PHILADELPHIA, Jan. 22, 1875.

DEAR SIR:—I have been unusually busy this day, or would have called to see you about the

ores. We could do nothing a year ago, because, first, we received no money from any source to help us to bear expenses of collecting and analyzing ores, and, second, because for a long time it seemed to be uncertain whether, in consequence of the failure of Congress to make the appropriation of \$3,000,000, we would have an exhibition.

The whole subject comes up at our annual meeting, Feb. 11. I think the present determination is to ask for ores and analyses to be sent to Philadelphia. We have no money to pay for analyses.

Truly and hastily,

JAS. M. SWANK.

THE IRON-MASTERS' LABORATORY, No. 339 WALNUT STREET, PHILADELPHIA, Jan. 22, 1875.

JAS. M. SWANK, Esq.—DEAR SIR: Please accept my thanks for your prompt reply of to-day.

I learn from it for the first time that your association has not acted in the matter, that you "think the present determination is to ask for ores and analyses to be sent to Philadelphia," and that the association is without means to defray the necessary expenses of the work.

I therefore conclude that the services of the Scientific Commission will not be required, and a meeting of it will not be called. Am I correct?

As a member of the Commission I wish to feel relieved from any responsibility.

Respectfully yours, J. BLODGET BRITTON.

OFFICE OF THE AMERICAN IRON AND STEEL ASSOCIATION, No. 265 SOUTH FOURTH STREET, PHILADELPHIA, Jan. 23, 1875.

J. BLODGET BRITTON, Esq., Philadelphia.—DEAR SIR: In reply to your favor received last evening I beg to say that our annual meeting will be held on the 11th of February, at which time the question of collecting ores for the Centennial will be either provided for or disposed of. Pending the decision of the association I would not like to take any steps that might lead to a dissolution of the scientific commission, and therefore pray you to reserve my withdrawal until after the determination of the meeting shall be announced. I am yours, very resp'y, JAMES M. SWANK, Sec'y.

THE IRON-MASTERS' LABORATORY, No. 339 WALNUT STREET, PHILADELPHIA, Jan. 23, 1875.

JAS. M. SWANK, Esq.—Sec'y Am. I. & S. Ass.—DEAR SIR: Please accept my further thanks for your reply of this date. The failure to secure a display, as was contemplated and most strenuously urged, of American iron ores at the Centennial Exhibition, I regret exceedingly; and every true American will regret it. It may with truth be charged mainly to the course taken by those having charge of the matter authoritatively. A great national work has been defeated, and a material public loss will result. Blame will unquestionably attach somewhere. Some of it may be unjustly cast upon the Scientific Board, whose aid, as was publicly announced, your association requested. As a meeting of that Board was never called, and nothing whatever entrusted to it, its members should not suffer. I believe that in justice to each of the gentlemen a meeting should be called at once, by direction of the Executive Committee of your association, and the facts to you have stated to me be communicated to all, and an opportunity given for such united action as may be thought proper. Perhaps something of importance may yet be devised at this eleventh hour, if the Board be allowed to speak at all. I, as a member of that Board, most respectfully beg that such a meeting be called, and notice to distant members be sent by telegraph. Not a moment should be lost.

With great respect, Yours, truly,

J. BLODGET BRITTON.

THE IRON-MASTERS' LABORATORY, No. 339 WALNUT STREET, PHILADELPHIA, Jan. 28, 1875.

MY DEAR SIR:—Understanding from your conversation yesterday that a meeting of the Scientific Board will not now be called, and that it is proposed on the part of your association to hereafter announce its inability to accomplish what it undertook to do, and simply request that ores, &c., with reports of analysis, be sent to the exposition at the sender's expense, I cannot upon reflection see how the board can give any aid whatever in the matter. I therefore beg you to accede to my request, and accept my resignation. Thanking the Executive Committee sincerely for the honor of the appointment, I am very truly yours,

J. BLODGET BRITTON.

To JAS. M. SWANK, Esq., Sec'y Am. I. & S. Ass.

OFFICE OF THE AMERICAN IRON AND STEEL ASSOCIATION, No. 265 SOUTH FOURTH STREET, PHILADELPHIA, Jan. 28, 1875.

J. BLODGET BRITTON, Esq.—DEAR SIR: I think that I have no time stated what would be the action of our association, but only what I supposed it would be. There is a great difference, you see. Wait until the 11th of February, when the whole matter will be decided officially. Hastily yours,

JAS. M. SWANK, Sec'y.

THE IRON-MASTERS' LABORATORY, No. 339 WALNUT STREET, PHILADELPHIA, Jan. 29, 1875.

J. M. SWANK, Esq.—DEAR SIR: My resignation was sent because I believed that any aid from the board would not be required, and I wished to be relieved from all responsibility. But if

* This refers to the original proposition in the letter laid before the United States Centennial Commission, at the general meeting held at the Continental Hotel, in Philadelphia, December 3, 1872.

my services can avail hereafter, be assured that they will be given most cheerfully and promptly.

Yours, very truly,
J. BLODGET BRITTON.

The Law of Patents.

(Continued.)

DECEASED INVENTORS, TITLE TO THEIR IMPROVEMENTS.

A patent granted to the administrator of an inventor is held by him *prima facie*, in trust for the heirs; and they must be made parties to a suit in equity on the patent so long as they retain such an interest.

But if the inventor had sold his interest prior to his decease, the assignee must be made the party, and not the heirs.

[N. W. Fire Extinguisher Co. et al. vs. Philadelphia Fire Extinguisher Co., 34.

FOREIGN PATENTS.

The validity of a patent is not impaired because the invention is embraced in a prior English patent, if, previous to the date of the latter, the American patentee had reduced the invention to practice.

[The National Spring Co. vs. The Union Car Spring Manufacturing Co., 224.

An English provisional specification is a bar to a patent only as a printed specification describing the invention. The patent constitutes no objection.

In order to be an effectual bar, the description must be so full as to leave no doubt as to the identity of the device.

[Cohn vs. The U. S. Corset Co., 259.

It is incumbent on the defendant in such a case to make out the sufficiency of the description.

The patentee's invention consisted in weaving corsets with pockets of varying lengths, so as to hold bones fitted to the contour of the body. A prior provisional specification described the weaving of corsets in which the pockets were made of "any required length," and which, when completed, would "contain all the elegance and grace of corsets made by manual labor;" and, it appearing that hand sewed corsets were well known at the time, with pockets adapted to the form, the provisional specification was held a bar to the patent.

Cohn vs. The U. S. Corset Co., 259.

FUNCTIONAL CLAIMS.

1. A claim for an effect or function cannot be sustained; the means by which the effect is produced, or the function performed, must be specified.

[Wheeler et al. vs. Simpson et al., 435.

INFRINGEMENTS.

Letter blocks with pictures upon some of their faces do not infringe upon a patent for such blocks with figures upon some of their faces, by which they can be selected in accordance with a key accompanying them, so as to spell particular words, such blocks with pictures having been long known.

[Hill vs. Haughton, 3.

If the combustion chamber of a furnace for burning wet fuel is constructed in other respects precisely as specified in the first and third claims of a patent it constitutes an infringement, although it has a flat inclined bottom and a wide throat instead of a *cyma reversa* bottom and a narrow throat, as described in the patent, and specified in other claims, but not in the first and third.

[Bantz vs. Haughton, 117.

A stone breaking machine in which the movable jaw is actuated by a hydraulic press operating through a piston rod, is an infringement of a patent for a similar machine in which the movable jaw is actuated by a pair of toggle levers, operated by a lever and crank rod; although in the former a safety valve is provided for relieving the pressure when such instance is encountered as to endanger the breaking of the mechanism.

[Blake vs. Robertson et al., 297.

The party who is defeated upon interference in the Patent Office is not prevented by the decision, nor by the patent issued upon it to the adverse party, from contesting the question of priority anew in a suit at law.

[Union Paper Bag Machine Co. vs. Crane et al., 801.

An unpublished description of an invention is not bar to a subsequent discoverer's obtaining a patent.

Neither is a rejected application for a patent by itself.

A rejected application may be received in evidence to establish prior invention in connection with evidence of the construction of a working machine embodying the invention, and successful experiments with it performed in public.

Such experiments, when they demonstrate the merits of the invention, cannot be regarded as abandoned, although they were not resumed, nor can another inventor have a patent for it afterward.

They cannot be so regarded, especially if the first inventor's application for a patent had been repeatedly and finally rejected by the Patent Office, and his circumstances were strained.

[N. W. Fire Extinguisher Co. et al. vs. Phila. Fire Extinguisher Co., 34.

The plaintiff's patent was for a refrigerator, and the first claim—the only one adjudicated upon—embraced, in substance, a reservoir for holding the ice, and a flue, or conduit, descending from it and carrying down the cooled air and discharging it through apertures into the body of the apparatus, whence it rises and enters the ice box again, through apertures in the top of it, thus creating a constant circulation.

[Monroe vs. The Dover Stamping Co., 688.

In a hand mirror, containing a wooden back with an extension for a handle, strengthened by metal rods, the whole being covered with a composition, to which form is given, while plastic in a mold, the novelty consists in the introduction of a wooden back and strengthened handle.

A patent for such a mirror is not infringed by one in which the back and handle are formed entirely of composition, though the handle is strengthened at its weakest part by nails imbedded in it.

[The Florence Manufacturing Company vs. The Boston Diatele Co., 728.

Making the lower roll in a fluting machine adjustable is an infringement of a patent for making the upper roll adjustable by similar means, and for the same purposes.

Making the roll adjustable by means of a rack and pinion instead of a screw is also an infringement.

[Knox et al. vs. Lowerer et al., 802.

INJUNCTIONS.

If the complainant's patent has been sustained in a suit, to the defence of which the defendants contributed, he is entitled to a provisional injunction against them, although they allege in their answer that they have a witness to the prior use of the invention who was not examined on the former trial.

The alleged testimony of such a witness will not prevent the issue of the provisional injunction, whatever may be its effect on the final hearing.

[Birdsell vs. The Hagerstown Agricultural Implement Manufacturing Co., 604.

INVENTION AND SKILL.

A patent for a fruit jar claimed, in combination, an outside shoulder below the top for holding the gasket, a cap with a rim pressing on the gasket, and a screw ring engaging with threads below the shoulder for holding the cover down; and it disclaimed a gasket which was pressed down upon a similar shoulder by means of a clamp, as well



RICHARD DUDGEON,

No. 24 Columbia Street, New York,
MAKER AND PATENTEE OF

Hydraulic Jacks and Punches.

ROLLER TUBE EXPANDERS

And Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order.



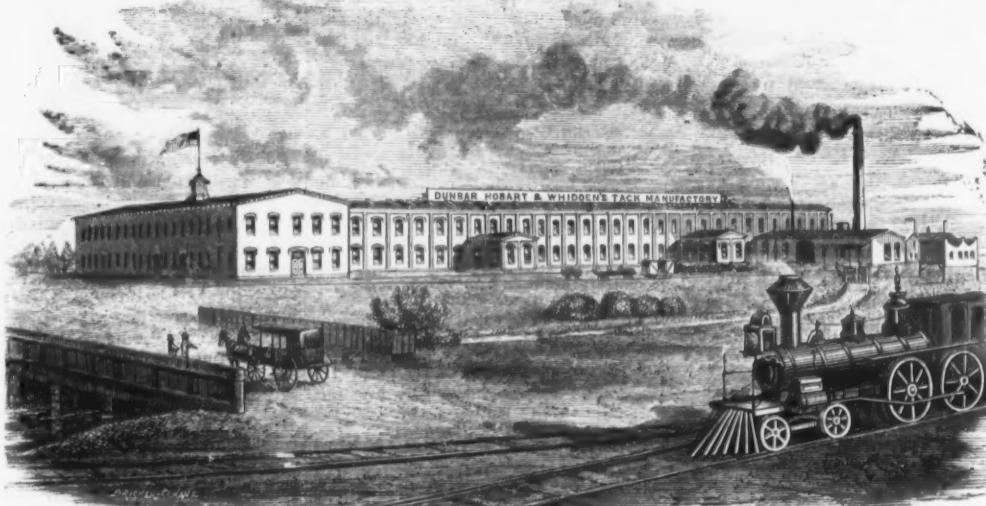
Braces, Curry Combs, Ash Shovels, Ferrules, Chisel
Rings, Garden Trowels, Pat. Ox Bow Pins, &c.

Manufactured by
G. W. & H. S. BARTHOLOMEW, Bristol, Conn.

HOBART'S TACKS.
MANUFACTURED BY
DUNBAR, HOBART & WHIDDEN,
Established 1810.

Office and Salesroom, 116 Chambers Street, New York

Factory, South Abington, Mass.



MANUFACTURERS OF
American, Swedes and Copper Tacks,

Tinned, Leathered and Large Head Carpet Tacks, Finishing Nails, Black and Tinned Trunk Nails, Miners', Gimp, Lace and Brush Tacks, Hungarian, Chair, Cigar Box and Barrel Nails, Glaziers' Points,

IRON, STEEL, COPPER, ZINC AND BRASS SHOE NAILS,

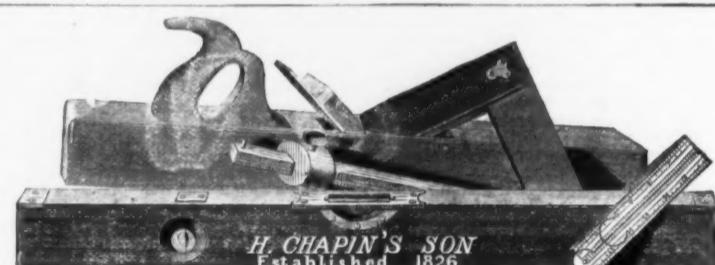
Heel and Toe Plates, Steel Shanks, and Fancy Head Nails, Silver or Japanned Lining and Saddle Nails.

A full assortment always on hand at salesrooms, for immediate delivery if required. Odd and irregular sizes made to order or cut from sample at short notice. Send for Price List.

RIEHL BROTHERS,
Ninth Street, near Coates, Philadelphia.
New York, 59 Wall Street.
Pittsburgh Store, 265 Liberty Street



"Patented" Furnace Charging Scale,
Double Beam R. R. Track Scale, Compound Parallel Girder Beams, &c. Patented
First Power Lever Wagon Scales. Testing
Machines any capacity.



Manufacturer of
Rules, Planes, Iron Planes, Grooving Plows, Gauges, Plumbs and Levels, Hand Screws,
Beach Screws, Handles, Door Stops, Try Squares, Sliding T Bevels, Turning Saw Frames
and Saws, Scholl's Patent Gauge, Butler's Patent Gauge, Boring Machines, &c., &c.
Illustrated Catalogues of 1874 furnished on application. Address,

H. CHAPIN'S SON Pine Meadow Conn.

COLLINS & CO., HARTFORD.

Manufacturers of **BEST QUALITY MACHINE MADE**

ADZE EYE PICKS, MATTOCKS, ETC.

Special Tools for Mining and Railway Work made to order.



Pattern No. 484, Polished Arms.



Pattern No. 484, Black Finish.



Pattern No. 485, Black Finish.



Pattern No. 488, Black Finish.



Pattern No. 487, Black Finish.



Railway Tamping Picks.



Adze Eye Pick Mattocks.



Adze Eye Long Cutter Mattocks.



Adze Eye Short Cutter Mattocks.

Orders from the trade solicited. Prices and terms on application to

COLLINS & CO., 212 Water Street, New York City.

Dense Castings.

A. Ledebur, of Groeditz, in Saxony, contributes a long and valuable paper on this subject to the *Berg und Hüttenmännische Zeitung*, from which we take the following:

In most cases we understand by a "dense casting" one in which the broken surface is perfectly homogeneous. This involves the absence of all hollow spaces like air and gas bubbles and weak spots, as well as the absence of substances mechanically mixed with the iron, which are partially foreign substances and partially secretions from the liquid metal itself. More rarely this expression refers to the texture of the metal, and especially in iron castings it signifies fine grained structure not too rich in graphite.

In order to study the condition necessary for obtaining dense castings, in both senses of the word, we must become acquainted with the foreign substances, both solid and gaseous, the admixture or separation of which renders the casting otherwise than dense, and the properties of the metal to be cast as well as the conditions which render the texture so or so.

Holes or bubbles in a casting may be produced in several ways. The simplest way is when the atmospheric air, which fills the molds before casting, does not have sufficient chance for escape, and is compelled to seek an exit, wholly or partially, through the liquid metal.

Only in a few cases will the metal remain fluid long enough to permit all the air bubbles to escape; in most cases, and with all metals difficult to fuse, like steel, cast iron, bronze and brass, the air bubbles remain suspended in the solidifying metal, and afterward appear as holes, with smooth surfaces, on working or accidentally breaking the metal, the break frequently being caused by these imperfections.

The danger of the formation of such holes, formed by the expelled air, is greater in compact castings than in weaker ones, not only on account of the larger volume of air to be displaced, but also because, for reasons to be mentioned hereafter, it is customary to use a less fluid and cooler metal the more compact the form of the casting. Hence it should be one of the principal objects of the moulder to provide a sufficient escape for the atmospheric air. In what is called *green casting*, where a more porous material is employed for the mold, there is less danger, and it frequently suffices to penetrate the side of the mold with the wire generally used to make an air vent. In large castings, however, and in all cases where dry molds of dense, impermeable materials are used, air pipes must be provided.

The air expelled by the metal is not the only cause of bubbles and holes, since they may be caused by vapor and gases generated at the moment of casting. The moisture always present in the material used for moulds, even when dried, is converted into steam by the hot metal; the black lead used to cover the mold, or mixed with the material used, forms carbonic oxide and hydro-carbon gas, beside other gases evolved from the straw and manure used to wrap the cores, &c. The violence with which these volatile bodies escape increases directly as their volume and inversely as the cross-section of the opening for escape, but the volume is for the greater part dependent upon the heat produced in the mold by the liquid metal, which both produces the gases and vapors as well as changes their volume by expansion.

It has been noticed that when the "boiling" of the cast metal does not cease before the metal begins to solidify, its density is diminished by air or gas bubbles. Another danger is that the combustible gases produced may be mixed with air in the proportion to form an explosive mixture, which suddenly takes fire and seriously damages the mold. This is more likely to occur with hollow cores, through the air filled interiors of which the gases evolved seek an escape. Hence the precaution should be taken to fill such hollow cores with a porous material like sand, fire-coke or charcoal, which permits the free escape of the gas and prevents the collection of a volume of atmospheric air, thus reducing to a minimum the chances of forming an explosive mixture. In all cases the combustible gases, either from molds or cores, should be set on fire at first to prevent the collection of a larger quantity of combustible gas.

There is still a third cause for the formation of gas bubbles in castings. This is when the liquid metal contains dissolved gases which are liberated on casting, or when a gas is formed by contact with the air. Iron, especially, has the power of dissolving large quantities of gases. According to observations heretofore made, these gases consist principally of hydrogen, carbonic oxide and nitrogen. The power of dissolving gases is not the same in all kinds of iron, being smallest in coarse-grained coke cast-iron, which is rich in graphite, and largest in spiegeleisen, rich in carbon, as also in bright cast iron and steel poor in carbon.

The danger of injury to the density of the casting by the escaping gas bubbles increases also as the melting point of the iron is higher. Hence it is difficult to produce a dense casting of steel, which is rich in gases and melts at a very high temperature. For this reason gas bubbles occur more frequently in non-carbonaceous, generally more infusible, charcoal iron than in highly carbonaceous and more easily fusible coke iron; more frequently also in cast iron just from the blast furnace, where it has been exposed for a long time, and at a heavy pressure, to a mixture of gases rich in carbonic oxide, than in cast iron from a second fusion in a cupola or flame furnace. In some kinds of cast iron, long, vertical, and pear or funnel-shaped openings are often found showing that the gas was liberated at the moment of solidification.

Beside the escape of dissolved gases new gases may be produced by the contact of the flowing metal with the air. Most metals, when

exposed to the atmosphere in a fused state, become covered with a film of oxide, and this oxide in turn, by giving up its oxygen, oxidizes the impurities in the metals, and the products of their oxidation in part rise to the surface (such as silicic acid), and there form new compounds with the metallic oxide; another portion, such as carbonic oxide and sulphurous acid, goes off as gas, producing the bubbles.

It frequently happens that in iron castings, which are otherwise dense enough, there are one or more round holes containing little iron pellets often as large as peas. These little iron bullets are produced by the spitting of the first portion of the iron which enters the cold mold, and usually show a white fracture when broken. They quickly become covered with oxide, and rise through the iron as it enters the mold. The film of oxide acts upon the carbon in the surrounding liquid iron, and form bubbles of carbonic oxide gas. If the iron is very strongly heated while casting the gas goes and the pellet of iron fuses again without doing any permanent damage. If the iron is not heated much above its melting point the pellet is found, on working the iron, surrounded by its envelope of gas. The reason why this occurs often with iron that has a high melting point than with the more fusible sorts is because the former solidifies quicker and at a higher temperature.

Exactly the same formation of gas takes place when wrought iron supports are used for the cores, and have not had the rust removed by acid or by filing, better still by tinning. These bubbles are always seen about these cores.

The holes produced in the iron by the above mentioned causes, whether from air or gas bubbles, are all more or less round or elongated and have smooth surfaces.

Beside these round, smooth holes, there are frequently jagged holes with the surface covered with minute crystals. They occur most frequently in alloys of copper and zinc, the broken surfaces of which are covered with indentations varying in size from a pin-head to a walnut. These are due to contraction on cooling. Compact castings solidify on the surfaces most exposed, and contracts against the still liquid portion within, which has not yet contracted. When the last portion solidifies and contracts, it leaves one of these open spaces, and at the moment of solidifying crystallizes. The size of the hole is, of course, directly proportional to the size of the casting, the temperature of the metal when cast, and the coefficient of contraction. If we suppose the flaws to be in the portion that cooled last it is not difficult to tell about where it is. These flaws are especially bad when two parts of very unequal diameter cross each other, and sometimes cause the smaller one, which cooled first, to break away from the larger one. For this reason such shapes are avoided if possible.

The flaws increase, too, with the difference of temperature between the temperature of the metal poured in and that of the solid metal, and hence they are frequently found near the spot where the metal is poured in. Finally, they are dependent upon the amount of contraction. The linear coefficient of expansion for cast iron is taken as 1.96, for zinc 1.80, for brass 1.62 of its length. Just as these figures increase, so does the difficulty of avoiding the formation of these holes.

Ledebur observed that a brass plate, which had been cast of strongly contracting metal without the necessary precautions, after planing off the outer rim, split into two plates, covered with crystals on the inside. These plates were held together only by the outer rim which had cooled first.

The tendency of cast iron to form these hollow spaces varies with the coefficient of contraction, which Ledebur says is different in different kinds, ranging from 1.125 to 1.62. The separation of graphite is an important factor here. Bright white cast iron has more of these flaws than gray, and pure charcoal iron with but little graphite more than gray coke iron with more graphite, while coarse grained Scotch cast iron, rich in silicon and graphite, and which contracts but little when melted alone, has the least flaws of any.

Among the mechanical admixtures which injure the density of the iron, it is scarcely necessary to mention particles of carbon, slag, &c., from the molds or from the lining of the casting vessels. In most cases the skill and care of the caster and the selection of good molding sand prevent these substances from injuring the iron. It is not so easy to get rid of substances that separate from the metal itself before or during the casting. It is mostly the products of oxidation, formed by the liquid metal coming into contact with the air, which thus injures the casting. Iron, copper, tin, zinc and lead are all metals which readily take up oxygen when in a liquid state. These are still more readily oxidizable because they are never perfectly pure, but contain foreign substances which oxidize themselves, and their oxides combine with the oxides of the metal to form salts. In some metals, particularly certain kinds of cast iron, the quantity of easily oxidizable foreign matter is so great that the whole surface becomes covered with a film in a few seconds. Such iron usually contains a good deal of silicon, and is called "impure" or dirty iron by foundry men.

It has already been shown that the products of oxidation may also injure the iron indirectly by producing gas bubbles. In some kinds of cast iron, when it is heated considerably above its melting point, a portion of the dissolved carbon crystallizes out, and being lighter than the iron, rises to the top, where it forms a spongy, crystalline structure, marring the whole casting.

The texture of cast iron is the result, the chief expression, of its attempt at crystallization on solidifying. This attempted crystallization is influenced by the constituents of the

cast iron, as well as by the other circumstances during the cooling. The more graphite there is dissolved in the liquid iron, and the slower and more quietly it solidifies, the larger grain and more crystalline the texture of the cast iron. In a large casting the solidification begins at the surface and proceeds gradually inward; as the exterior solidifies more rapidly than the interior, the texture is never perfectly homogeneous, being finer grained the nearer it is to the edge, and coarser grained the farther it is from the surface.

The separation of graphite and the formation of texture go hand in hand, or, rather, the latter is dependent on the former. The influence of slow or rapid cooling is not the same on all kinds of cast iron under otherwise like conditions. Some kinds, from easily reducible and difficultly fusible iron, even when rapidly cooled, have a distinctly crystalline, granular structure, with an intermixture of graphite scales. Others, from easily reducible and easily fusible ores with manganese in them, on cooling rapidly, hold all the carbon in combination and show a white, radiant fracture. In certain cases the latter property is employed for making hard castings with white surface and gray interior, but may, under other circumstances, where a soft homogeneous casting is required, act injuriously.

Only in rare cases is an uneven structure in cast iron due to other influences than the conditions of solidifying. Sometimes, when different kinds of cast iron, hard and soft, are mixed and melted together, there will be found lumps of dense hard iron in the middle of the softer and coarse grained mass. This phenomenon indicates that certain kinds of iron are unwilling to unite with those of very different properties to form a homogeneous mixture, and it would be well to bear in mind this property of many kinds of cast iron when selecting iron for castings.

Ledebur next cites some cases where the upper portion of a casting was found to contain more graphite than the lower, and advances a theory to account for it. We pass on next to a consideration of the different means employed to produce dense castings.

In the first place, if one part of the casting is more important than another, this is put at the bottom. This simple remedy has been found generally efficient. All foreign substances, whether gas or solid, that injure the density of the casting are lighter than the iron, and hence rise to the upper part, whilst the lowest portions of the casting are quite free of them. In most cases the iron enters the mold from the top, and the upper part cools last. The flaws due to contraction, we have seen above, are in the part that solidified last.

The position, whether top or bottom, does not have the influence that many suppose upon the texture of the iron or other metal. The arrangement of the molecules, we have seen, result solely from the influences of cooling and the composition of the cast iron, not being changed by the static pressure of so short a column of iron.

If the casting is one that should be dense and free from flaws and foreign substance, not in one part only, but in all parts, the casting is made higher than necessary, and the superfluous portion above, called the "lost top," is afterward broken off and melted over.

There are two principal conditions to be fulfilled by this "lost top." In the first place, it should receive all the foreign substances rising from the liquid iron, and thus remove them from the casting. This object is easily accomplished by a little care. In the second place, it should not solidify until after the casting, so that the flaws due to contraction shall be in this last fluid portion. To accomplish this the section as well as the height of the top must be carefully regulated to the form and size of the casting.

In spite of this the object is not always entirely accomplished, because the shape of the casting sometimes prevents the construction of a suitable top. It is customary to assist its action by keeping it open as long as possible by moving an iron rod up and down in it, and diligently pouring in fresh iron until perfectly solid. Pouring in a fresh quantity of very highly heated iron, is undoubtedly an advantage, but poking it with a rod is a doubtful aid, as the cold rod chills it somewhat. It seems more advisable to keep the top as warm as possible by throwing on hot coals, and when a crust begins to form, to break it through and pour on very hot iron until solid. Very high and heavy tops do not affect the structure through their hydraulic pressure, as generally supposed.

When it is desirable to make a cylindrical casting, with a pure and dense surface, as for all kinds of massive rollers, the iron is allowed to enter the upright mold in a tangential direction, so that it fills the mold by a circular motion.

The centrifugal force throws the heavier iron to the circumference and separates it from its impurities which seek the center, where they also ascend more easily.

Although this process is ingenious, and has been successful in many cases, yet it must not be forgotten that the not inconsiderable centrifugal force may tear off pieces of the mold, either sand or black lead, so that the shape is injured, or, at least,

the density of the iron is impaired by the ad-

mixture of this foreign substance, which does not usually have time to reach the center.

To avoid this the best quality of molding sand must be used, and a carefully prepared black lead, or dust, and great care must be taken in blacking and drying the mold.

The sort of iron employed, of course, effects the density of the casting. It is more difficult to make dense castings with iron that dissolves a considerable amount of gases which are set free before it solidifies; or with iron that oxidizes readily or contains a large amount of easily oxidizable elements; or that has an tendency to cover itself with a film of graphite crystals;

or with that which contracts much; iron that melts at a very high temperature is more liable to contain little pellets caused by spitting. Practice and care seem to be the best teacher on this point. Those kinds of iron with which it is difficult to make dense castings, mostly possess other properties that make them valuable to the founder, and hence they are generally combined with iron of a different quality so as to neutralize the bad properties and unite their good ones.

It is also to be observed that the texture of every casting depends on the time consumed in cooling, and indirectly on the size. To obtain a fine grained structure, a finer grained and less graphitic iron must be selected if the casting is large and compact; coarser grained and more graphitic if casting is small.

The manner of smelting must also be taken into consideration. Flame furnaces produce a different product from cupola furnaces, and these again different from fusion in crucibles. With iron the texture is finer, the amount of graphite less, and the quantity of foreign and injurious admixtures also less the longer the melting or melted iron is exposed to the air. Hence it is preferable to cast large rollers, cylinders, &c., which require a fine grain and pure iron, from a flame furnace, while for the ordinary purposes of the foundry the rapidly smelting cupola furnace, which exposes the iron but little to the action of the blast, furnishes more suitable material.

Finally, the temperature of the fused metal, especially of iron, on casting, as well as the treatment before casting, are of no small importance in obtaining a dense casting. The less the metal is heated above its melting point, the more difficult it is for any foreign substances in the metal to rise to the top, and hence the greater the danger that the cast will be a failure, aside from the danger of scalding before the mold is entirely full. The hotter the metal on pouring, the greater the danger of flaws by contraction. There is, however, a middle course by which both dangers are avoided. The metal is drawn very hot into the ladles and allowed to stand until of a proper temperature to pour into the molds, which depends on the size and shape of the casting, while the foreign substances have time to separate. To aid this separation the metal is constantly stirred. This manipulation is more important than most persons suppose. Dissolved gases escape more readily from the liquid when in motion than when quiet, and burn on the surface of the bath with little blue and white flames. The crystallized graphite rises to the surface, the silica forms silicic acid and rises also to the surface where it combines with the oxides already there. By skimming off the surface a refining process on a small scale is carried on, in which the oxygen of the air as well as the basic slag formed on the surface serve as powerful agents. The cast iron becomes purer, not only from substances mechanically mixed with it, but from foreign matter dissolved in it, hence the casting becomes denser and the texture of a finer grain. The bath must be carefully skimmed so that the metal shall have a clean surface when poured into the mold.

Great Corporations.

We take the following from the *Daily Bulletin*:

It has long been the fashion to decry large corporations. They are stigmatized as oppressive. It is charged that they ruthlessly suppress the competition of smaller enterprises; that they conflict with that healthy development which starts with small beginnings; that they are selfish and can live only by crushing out all opposition; and that having succeeded in clearing their path of opponents, they become recklessly exacting in their demands upon the public. Upon these grounds, great corporations are denounced as enemies of the public welfare, and to be placed under the most rigid legislative restrictions and under strict government surveillance. Within the last three years, the Grangers have come forward as the special exponents of this idea. In Iowa, Illinois, Wisconsin and Ohio, they have procured the enactment of laws specifically intended to restrain the free action of railway corporations. They have encouraged similar legislation as against insurance companies. Just now, they are demanding in the legislature of this State the adoption of a special tax upon the capital of all corporations. And conscious that the great enterprises ordinarily executed by the large companies against which they are crusading must nevertheless be undertaken by some concentration of power, they are found backing all sorts of schemes of governmental enterprise, including the construction of canals, the building of railroads, the working of telegraphs, etc.

Undoubtedly, much may be truthfully said against corporate uses of capital. Many enterprises are undertaken by companies which could be much more successfully worked by private individuals. In the management of companies there is less inducement to industry, caution and economy than exists in the conduct of a private undertaking. The motive of self-interest operates less directly and with less force; and experience has demonstrated in too many cases that the private interests of managers are put in conflict with the interests of the corporation. In short, it is claimed that for a corporation to be as successful as a firm in the prosecution of any undertaking, it has to be assumed that the sense of duty and of high moral principle will be as efficient a motive in its management as self-interest—an assumption altogether too flattering for these times. Nevertheless, on the other hand, experience proves that individuals and firms do not always possess the wisdom and prudence that are to be found in the collective counsels of a well regulated company. The truest test of the com-

parative excellence of methods is to be found in success; and, applying this rule, we shall not find corporate enterprise generally at disadvantage. Failures of corporations are comparatively infrequent; private failures are of every day occurrence; and it may, perhaps, be reasonably questioned whether the private employment of capital, taken on an average, yields a better return than capital invested by corporations.

The popular prejudice lies chiefly against large corporations, and the common charge against them is that they are "monopolies." This much, however, is to be said for them, that they have become large through being successful; that they have become successful, as a rule, through conferring important advantages upon the public, and through rendering such services better than others; for that is the real meaning of success in all enterprise, whether private or corporate. It is further to be said, that while the ascendancy which their success gives them may tend to drive out of the field numerous minor competitors, and thereby tempt them to an abuse of their power, yet the more complete their success becomes, and the larger their profits, the greater is the inducement for the formation of other large combinations of capital to enter into competition and check their capacity and enforce thorough methods of management, and to secure for the public such services as it may be their business to render at the lowest possible cost. Thus it is a law in the corporate employment of capital that one great successful company calls into existence another or others, and that the competition thereby created protects the public against corporate wrongs and abuses, and results in advantage to the people at large. This at least is the rule, and the only exception is in cases where the business to be done is so limited as not to admit of any indefinite extension of competition.

The very class of companies against which the outcry of monopoly has been most loudly raised is the one in which this law has worked most conspicuously. The echoes have not yet died out of the clamor raised against some of our leading railroads for consolidating a number of minor roads into one great company; and yet we already see these mammoth corporations, which were to be the oppressors of our commerce, engaged in a deadly struggle for the trade of the country. Every attempt made between them to agree upon common rates of freight has almost instantly broken down, and it is demonstrated that henceforth they can regard each other only as enemies, destined to perpetual conflict. The fight between these gigantic competitors has reduced the charges for inland transportation lower than they were ever known in the history of the country. Their anxiety to carry off the prize of traffic compels them to adopt every form of improvement, to resort to every method of economy, to shorten distances and to increase speed, and to afford to the mercantile public every possible accommodation and convenience.

It is impossible honestly to deny that these results have followed, and are likely to be realized in a still larger degree from the great railway consolidations that have been effected within late years. It is a singular reflection upon the sagacity of a class of zealots and perhaps well-meaning mercantile agitators, that the very causes which they denounced as threatening the ruin of our trade should have been the means of bringing about the "cheap transportation" which they declared the railroads would never voluntarily afford. The cheapness and the protection which they have combined to demand through legislative enactments and Congressional control, and mammoth government railroads and federal canals has already come unasked for from the railroads themselves. We may take it as settled that railroad consolidation has solved for this generation the question of cheap transportation. With four great trunks, extending their arms to every part of the Continent, and each one eager to grasp from the other the traffic within its reach, the public need no other protection than such as will arise from the efforts of the competitors to outwit one another in the completeness and cheapness of their services. The mission of the Grangers, of cheap transportation associations, of "Potter laws," and of Congressional railroad commissions, is therefore ended; and the sooner these agencies cease to parade their quack remedies for what is no longer a public disease, the sooner will confidence be restored to railroad investors, and capital be again contributed to maintain that activity of competition which is necessary to keep down the rates of rail transportation.

Automatic Gas Lighter.—Instead of electricity for lighting gas, Baumester employs a small accessory flame, which burns all day, with a consumption of 0.04 cubic feet per hour, or even less, though when less than 0.03 cubic feet, the flame is liable to be extinguished by draft. By regulation of the pressure, this flame is made to flare up and ignite the principal jet, and it then goes out; and again, by a change of pressure, the principal flame is extinguished, and the small one relighted, and the flow of gas to the principal burner again completely checked. There is also an attachment, which, under the average pressure, allows only a definite flow of gas through the burner, and which, it is suggested, can also be arranged as a simple and convenient pressure regulator.

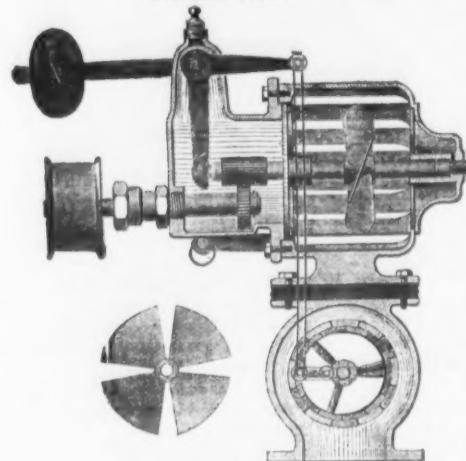
Electron of Officers of the Milwaukee Iron Co.—At a recent election the following gentlemen were chosen officers of the Milwaukee Iron Company: President, J. J. Hagerman; treasurer, Alexander Mitchell; secretary, pro tem., John H. Van Dyke; Directors, Alexander Mitchell, Milwaukee; Chas. F. Illesley, Milwaukee; John H. Van Dyke, Milwaukee; S. P. Burt, New Bedford, Mass.;

HUNTOON GOVERNOR

For Stationary and Marine Engines.

WARRANTED

The Most Perfect Steam Governor in the World.
Sectional View.



Absolutely Govern the Engine,

which will run uninfluenced by the varying pressure of steam, be it thirty or eighty pounds.

In a moment's time the revolutions of the driving wheel can be changed to exactly the speed required without stopping any of the mechanism, running perfectly governed wherever set.

These Governors are fully Warranted in every Particular.

Address, for circulars of references, &c.,

Huntoon Governor Co.,
Lawrence, Mass.

Wellington Mills London EMERY.



SALE AGENCIES:
Homer, Foot & Co., - Springfield, Mass.
C. Foster & Co., - Worcester, Mass.
J. Clark Wilson & Co., - New York City.
Chas. M. Grisley, - Philadelphia, Pa.
Belcher Bros., - Providence, R. I.
Baader, Adamson & Co., Chicago, Ills.
Baader, Adamson & Co., Cincinnati, Ohio.
Clemens Vonnegut, - Indianapolis, Ind.

Sold generally

BY ALL PRINCIPAL DEALERS IN
Hardware
IN THE UNITED STATES.

The "Swift Mill."

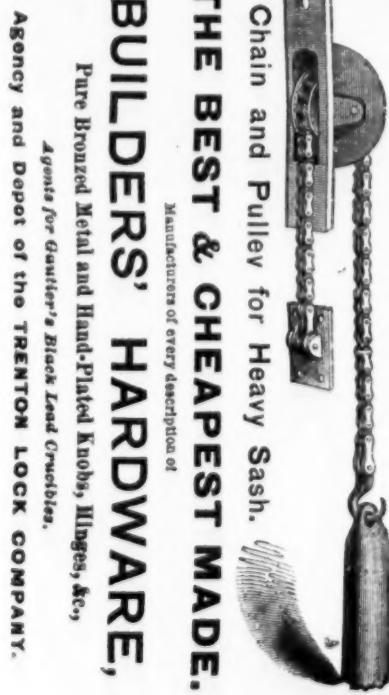


HIGHEST AWARD SILVER MEDAL at the last Fair of American Institute, N. Y. The best ever made. More than 80 different styles and modifications suited to Grocers and others. Full catalogue on application to the manufacturer.

LANE BROS., Millbrook, Dutchess Co., N. Y.
Or their General Agents, S. HAVILAND & SON, 259 Pearl St., N. Y. Also sold by the Hardware Trade.

Many & Marshall,
48 Warren St., N. Y.

SASH CHAIN. PAD LOCKS



Chain and Pulley for Heavy Sash.
Manufacturers of every description of
THE BEST & CHEAPEST MADE.
BUILDERS' HARDWARE,
Pure Bronzed Metal and Hand-Plated Knobs, Hinges, &c.,
Agents for Gauthier's Black Lead Crucibles.

WILSON BOHANNAN,
Manufacturer of Patent

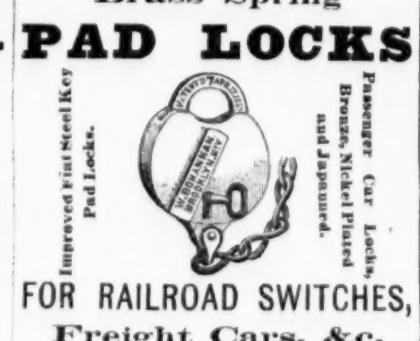
Brass Spring

FOR RAILROAD SWITCHES,
Freight Cars, &c.
Cor. Broadway and Kosuth Street,
BROOKLYN, E. D., N. Y.

THE PULSOMETER,
OR
Magic Pump.

The simplest, most durable and effective pump now in use. Adapted to all situations, and performs all the functions of a pump without the consequent wear and care. No machinery about it. Nothing to wear out. Will pump gritty or muddy water without any trouble. The pump will not get out of order. Branch Deposits: 104 Sudbury St., Boston, Mass.; 102 Market St., Philadelphia, Pa.; 59 Wells St., Chi. T., Ill.; 110 South West St., Exposition, New Orleans, La.; 81 & 83 North Second St., St. Louis, Mo.

C. HENRY HALL & CO.,
20 Cortlandt Street, New York City.



Pad Locks.
Passenger Car Locks.
Bronze, Nickel Plated.

Hopkins & Dickinson Manufacturing Co.,

FINE METAL WORKERS,

Works, Darlington, N. J.

69 Duane Street, N. Y.

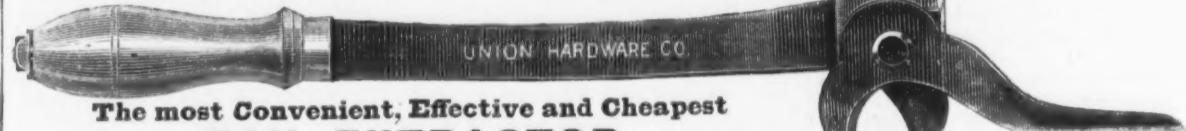
Hand Made Locks and Real Bronze Hardware.

NEW AND ARTISTIC DESIGNS FOR

Private Residences, Banks, Churches and Public Buildings.

UNION HARDWARE CO.,

120 Chambers and 50 Warren Streets, New York.



The most Convenient, Effective and Cheapest
NAIL EXTRACTOR

In the Market.

Large Trade Supplied.

WILSON & EVENDEN'S PATENT

OIL TANKS.



Superior to all others for Carbon and Lubricating Oils

For descriptive circumstances and prices address the manufacturers.

Shipping Can Mfg. Co.,

E. F. W. WETZEL,
75 Warren St., New York.

PHILLIP'S
Patent Boring Machine



Guaranteed the best Boring Machine in the market. It will do one third more work than any other machine. The Auger is self measuring, self gauging and self drawing. With the recent improvements in construction, strength and finish, it is decidedly the cheapest, most durable and most rapid working machine made.

Sold to the Hardware trade only.

Address, for descriptive Circular and Price List

PHILLIPS MFG. CO., Pittsburgh, Pa.

J. CLARK WILSON & CO.,

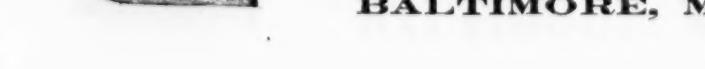
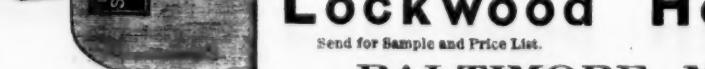
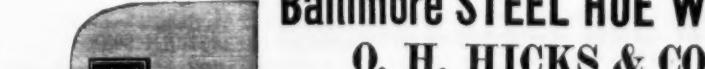
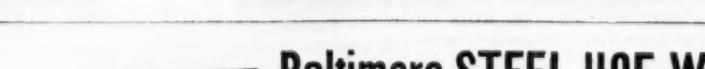
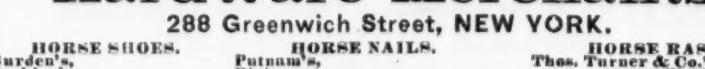
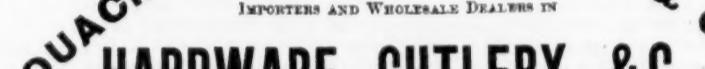
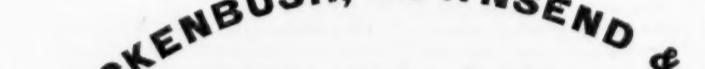
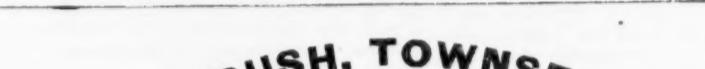
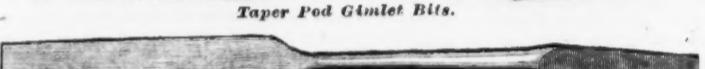
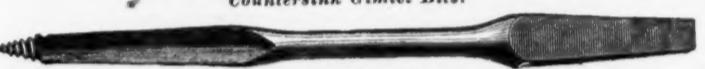
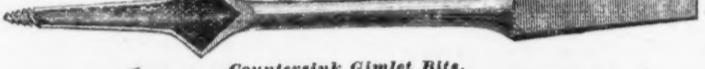
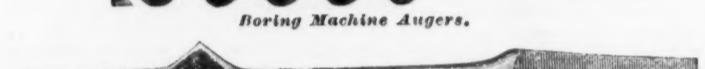
American and Foreign Hardware Commission Merchants.

51 Beekman Street, New York.

Sole Agents for the SNELL MFG. CO.

Manufacturers of REGULAR AND ANGULAR BORING MACHINES, And Lewis' Pat. Self-Withdrawing Boring Machines, C. S. Car Bits, C. S. Auger Bits, C. S. Carpenters', Millwrights' and Gas Fitters' Augers, Taper Pod Gimlets and Gimlet Bits, Countersink Gimlets And Screw Driver Bits, Augers, Auger Bits, and all manner of Boring Implements furnished to order with promptness.

Illustrated Price List sent on application.



EXCELSIOR LAWN MOWER.

IT HAS THE LARGEST SALE OF ANY LAWN MOWER IN THE WORLD.



It has been adopted and can be seen in practical operation on **Central Park** and all the other **City Parks, New York**; **Government Grounds and City Parks, Washington**; **Boston Common, Boston**; **Prospect Park, Brooklyn**; and on almost every prominent Park throughout the **United States and Canada**. Four sizes for hand-power; four sizes for horse-power.

Prices from \$15 to \$200. EVERY MACHINE WARRANTED.

ADDRESS,

CHADBORN & COLDWELL MFG. CO.,
Newburg, N. Y.

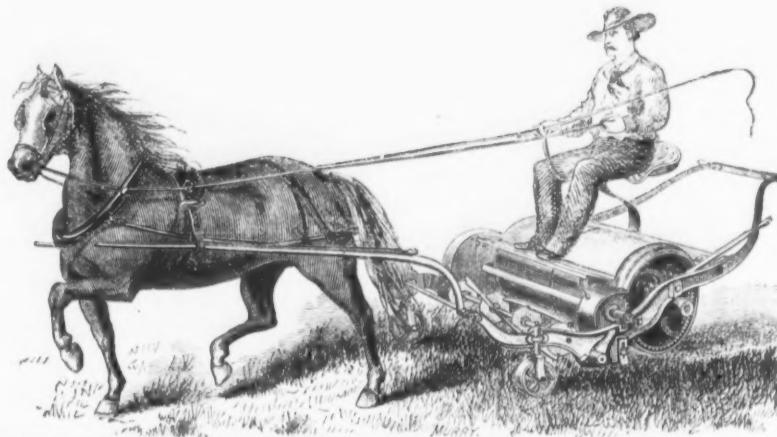
Send for Circular.

The Great Trial.

At the trial held in New York city, on the 25th of June, 1874, the **New Excelsior** was awarded the First Premium (a Silver Medal) by the American Institute, in competition with all the different Lawn Mowers now made in this country.

The New Jersey State Agricultural Society, at its Annual Fair, in September, 1874, awarded the **New Excelsior** the highest honor and the First Premium (a Silver Medal) after a full and fair test of its merits as compared with three other of the principal Lawn Mowers now in use.

This Proves THE EXCELSIOR the best Lawn Mower in the World.

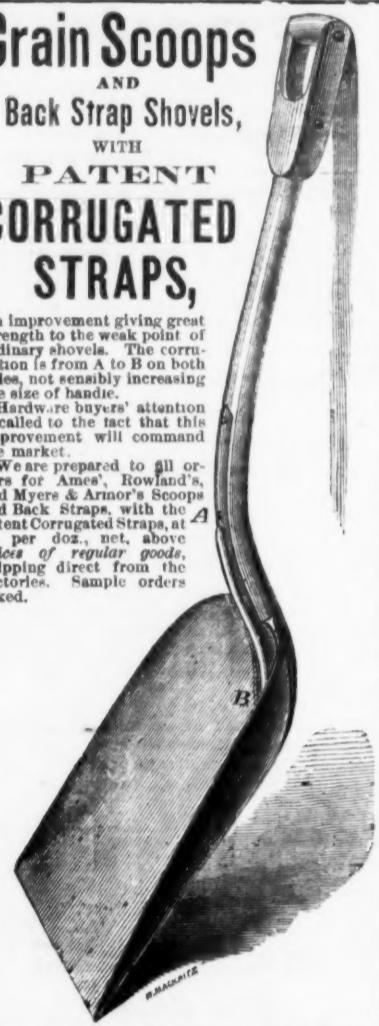


Grain Scoops
AND
Back Strap Shovels,
WITH
PATENT
CORRUGATED
STRAPS,

An improvement giving great strength to the weak point of ordinary shovels. The corrugation is from A to B on both sides, not sensibly increasing the size of handle.

Hardware buyers' attention is called to the fact that this important invention will command the market.

We are prepared to fill orders for Ames', Rowland's, and Myers & Arbor's Scoops and Back Straps, with the patent Corrugated Straps, at \$1 per doz., net, above price of regular goods, shipping direct from the factories. Sample orders asked.



Simple, Birge & Co.,

13 South Main St., ST. LOUIS, MO.,

Sole Western Agents.

The Livingston Horse Nail Co.,
95 Reade Street, NEW YORK,

Sole Eastern Agents.

Schweitzer Mfg. Co.,
57 Reade Street New York.



CONTINENTAL LOCKS.

Made of Wrought Iron or Brass, very superior in quality, and only an auger used in mortising.

EXCELSIOR COMPASSES.
EXCELSIOR DIVIDERS,

WITH
STUBBS' STEEL POINTS.

Best and Cheapest Goods in the market. Sole Agents for the United States for

NEWBOULD'S FILES AND TOOLS

French Coffee Mills.

NOBLE MFG. CO., Tools, Ship Angers, &c.

We also make a superior

AXE. "Queen of the Forest," &c.

DIASSTON'S SAWS. (Largest Stock in the City).

General dealers in

FOREIGN & DOMESTIC HARDWARE.

W.M. BALDWIN'S

Solid Cast Steel Carpenters' and Machinists' Hammers, Mining Sledges and Blacksmiths' Tools,

TACKLE BLOCKS,

And Humphrey & Bartlett's Horse Brushes.

GRAHAM BROS.

London and Stockholm.

Engineers, Anglo-Swedish Merchants

And Engineers' Agents.

First-class Makers of Machinery & Specialties, desirous of extending their exports, will find it in their interest to supply us with full particulars and prices, &c., &c.

London—199 Cannon Street, E.C.

More than
6,000,000
Of One Number Alone of the
Justly Celebrated
SPENCERIAN
Double-Elastic
STEEL PENS

Were sold in 1874—being a gain of more than 1,000,000 over the year previous; this, with the marked increase in the sales of the other numbers, shows that the **superior quality** of these Pens are being more and more appreciated, and that they are destined to take their place as the **most popular** Steel Pens in the market. They are made of the **best steel**, by the **most skillful workmen in Europe**, and are a nearer approximation to the real **Swan Quill** action than anything of the kind hitherto invented.

The Spencerian Steel Pens are **universally used** in the **Commercial Colleges** throughout the U. S., more largely than any others by the **United States Government**, and quite generally in the **Banks, Counting Houses and Schools** of the country; and are **for sale by the trade generally**.

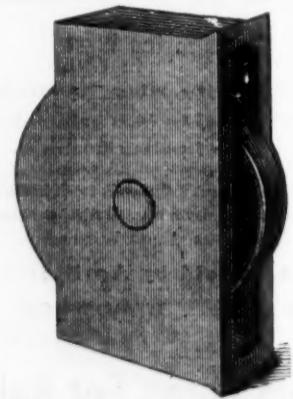
We claim for the Spencerian, superiority over all other pens in **durability, elasticity, flexibility, and in evenness of point.**

** The Spencerian Pens are comprised in **15 numbers**, varying in flexibility and fineness of point, and, for the convenience of those who may wish to try them, we will send a card containing a sample of each number by mail, securely enclosed, on receipt of 25 cents.

Address all orders to

Ivison, Blakeman, Taylor & Co.,
138 and 140 Grand Street,
NEW YORK.

Drum's Pat. Axle Pulley.
Round or Square Ends.



The best and cheapest pulley in the market. No flange to mortise in. No screws required.

Over 60,000 doz. sold in the West alone. Satisfaction guaranteed. Send for price list.

LIVINGSTON & CO., Pittsburgh, Pa.

GEO. M. SCOTT
MANUFACTURER
OF
BELLows
JOHNSON ST.
COR. 22D.
CHICAGO.

Standard
SCOTT'S
BELLows.

Emery.

A recent number of the **Emery Grinder** contains an article under the above title, from which we condense the following:

Emery is a variety of corundum, or, it is of the same mineral species of which corundum, sapphire and oriental ruby are varieties, and agrees with them very closely in composition, hardness and specific gravity, but in appearance it is dull and opaque and though its masses are very compact, they are not crystallized.

Emery was long regarded as an oxide of iron, and was called by Haug *Fer oxide quartzifere*, hence it is sometimes called by mineralogists ferruginous corundum, because it contains a certain quantity of iron.

SOURCES OF SUPPLY.

The crude emery stone has never been found in any considerable quantity for consumption, except in the countries bordering on the eastern part of the Mediterranean Sea, near Smyrna on the Asiatic continent, and on the contiguous island of Naxos, from which two sources all the world is supplied.

Emery is very abundant in the island of Naxos, at Cape Emeri, which is the property of the Greek government. Dr. Lawrence Smith, the American geologist, while residing in Smyrna, made a discovery of a deposit of emery. He made an examination of the locality in 1847, and having reported his discoveries to the Turkish government, a commission of inquiry was instituted and the business soon assumed a mercantile form. All that is used at present in the arts, comes from Turkey, near ancient Smyrna, and from Naxos, which sources seem to be the same geological deposit reaching under the sea from the Continent to the island, in the same manner as the basaltic formation of the Scotch Fingal's Cave and the Irish Glan's Causeway, stretches under the Irish Channel.

CONSUMPTION OF CRUDE EMERY.

The contractors who work the Turkish and Greek mines, are obliged to mine, at each, from 2000 to 2500 tons per annum. The maximum annual product and the total consumption of crude emery for all uses does not exceed 5000 tons, and often falls below that quantity, of which the Wellington Mills, London, consume one-fourth of all that is yearly mined.

PROCESS OF MINING CRUDE EMERY.

The mining of emery is of the simplest character; the natural decomposition of the rock in which it occurs facilitates its extraction. The rock decomposes into an earth, in which the emery is found embedded. The quantity procured under these circumstances is so great that it is rarely necessary to explore the rock. Its color varies from red brown to dark brown. Its specific gravity is about 4.4, and it is so hard as to scratch quartz and many precious stones. The earth in the neighborhood of the block is almost always of a red color, similar to red oxide of iron, and serves as an indication of its proximity to those who are in search of the mineral. Sometimes, before beginning to excavate, the spots are sounded by an iron rod, with a steel point, and when any resistance is met with, the rod is rubbed in contact with the resisting body, and the effect produced on the point enables a practised eye to decide whether it has been done by emery or not. The blocks, which are of a convenient size, are transported in their natural state, but are frequently broken by large hammers. When they resist the action of the hammers, they are subjected to the action of fire for several hours, and on cooling they commonly yield to blows. The crude stone is shipped in blocks of various sizes, from 15 lbs. in weight down to pieces the size of an egg, but larger stone is preferred, being more compact and hard. It sometimes happens that large masses are abandoned, owing to the impossibility of breaking them into fragments of a size convenient for transportation to the sea-coast, camels and horses being the only means of transportation.

From the foregoing description of the collection of crude emery, it will be evident that much stock of inferior quality is shipped. This is disposed of to crushers or to their purchasing agents, who knowingly choose the lower priced stock, or, ignorant of the varying product of a mine, are deceived by the lower price of the poorer stone. Inferior emery is therefore sometimes produced from Turkey or Naxos stone, because sufficient care or knowl-

edge is not used in the selection, or because it is not skillfully and faithfully manufactured.

EXPORTATION OF EMERY.

With the exception of small orders which are sometimes sent to Smyrna commission agents for crude stone to be directly shipped to U. S. A., for use of American crushers, the entire product of emery is sent forward by the contractors to England, and all crushers are supplied from the stock of crude stone there.

MANUFACTURE OF EMERY.

The large pieces are broken up by the emery manufacturers by use of steam hammers or hand sledge hammers to a size convenient for placing in Blake Bros. American patent crushers, which machines reduce it to the size of a walnut; these are again placed under stampers, rollers and crushing machines until the whole is reduced to the required fineness; it is then conveyed to the sifting machines to separate the various grades of grain; the meshes of wire used for obtaining the various grades vary from sixty holes to many thousand holes in the square inch. The manufacture of crushed emery is very destructive to all the machines employed in crushing and assorting the grain, owing to its abrasive quality, which fast wears away all metal with which it comes in contact. The final process of sifting and grading the emery requires great care, skill and judgment to obtain an accurate and uniform grain of the several grade sizes.

The process, moreover, is necessarily a disagreeable and dirty one, as the air of the apartment is filled by the fine dust of emery, and being inspired into the lungs is irritating at all times, and, indeed, is no doubt often permanently injurious to them.

DIFFICULTIES OF MANUFACTURERS.

The difficulties that beset the trade of emery crushing are manifold; by a recital of them, it may cease to be a surprise that consumers have experienced such frequent loss and annoyance in its use, and that they are only slowly learning by experience the false economy of attempts to use any but the very best standard and known quality. We therefore proceed to call attention to the difficulties that hinder the production of really reliable emery, and which have hindered consumers from obtaining it with certainty when produced.

First.—The crude emery, in mass, is very far from being of uniformly good quality, even when it is shipped in hard, compact and heavy pieces. Tenant's analysis of a very fine cabinet specimen showed 80 per cent. grit, while his analysis of some other specimens showed only 50 per cent. grit.

Second.—It will be noted, from the description of the condition of the mining sources, that disintegration of the stone exists in the mines; in a long lapse of time the particles have become crumbly, and the red earth in which the masses are formed is the *debris* of the perished stone. This deterioration toward a crumbling state in much of the mass is in actual operation, though partial, and renders each mass more or less susceptible of dissolution into atoms by abrasion in the degree of its progress toward decay from its primitive compact state.

Third.—The laborers are not more faithful in oriental than in occidental countries to expend voluntarily their efforts to invariably secure the stone which is hardest to work, as their wages are dependent on the weight mined.

Fourth.—The bad faith of the Greeks is proverbial, and the Turks are in little better repute; their government inspectors have no incentive to do more than secure the pay for all that is obtained, regardless of its quality, and therefore the contractors' agents have not at all times the very best chance to get the best quality, even if they were fully faithful to their employers' interest.

Fifth.—The pulverization and grading of a quantity of stone produces sizes, proportionate quantity of the several grades of which is quite uncertain. This uncertainty is dependent on the quality of the lot of crude stone, and, to a certain extent, on the skill in the work, but skill cannot largely control the relative proportion of sizes yielded.

Among the largest crushers of emery in the world are the Wellington Mills, London, the excellence of whose product, under a copyright label, has gradually and surely brought their emery into use among some of the largest and

most critical consumers, and they have twice been compelled to enlarge their mills and business premises to meet the demands made upon them.

The site of the mills—the total area of which is 38,800 feet—has a frontage of 155 feet in the Westminster Road, and runs back along Mead's Row for a distance of 340 feet in a straight line. The plan is that of a hollow square, with the warehouse and offices fronting the Westminster Road, the factory premises on the other three sides, and the chimney stalk, boilers, engines and stampers (for crushing glass and emery) in the center. The warehouse, Italian in its general proportion and details, is 85 feet long, 50 feet wide, and 57 feet high; the basement, 10 feet high, is used for the stowage of goods and stores; the ground floor, 14 feet high, with its central entrance and three windows on each side, is faced with Portland stone, and contains the offices (home and export), the sample rooms, &c. Above this are three stories, each 11 feet high, faced with white gault bricks, with stone string courses, moulded brick reveals to windows and terra cotta cornice. The floors are formed of 2 in. flooring, on joists 12 in. by 3 in., carried by 12 in. rolled iron girders, and these are supported by cast iron columns 10 in. diameter in the basement and decreasing to 4½ in. in the top story. A wide and handsome pitch-pine staircase connects from the ground to the first floor; a workmen's stairs leads from the basement to the floor. Lavatories, &c., arranged on each story, and a steam lift runs up throughout the entire height. Adjoining this warehouse, with its bold iron railing next the road, is the entrance for carts (which pass over a weighing machine on their way to the yard), and a campanile, 60 feet high, flanks the gateway at its southern angle. Next follows the gate-keeper's residence and then the factory proper. This consists of a continuous range of workshops, 500 feet long by 30 feet wide, and three stories in height, in which the various processes of manufacture are carried out. The machinery is worked by three engines, of which two are 30 horse-power, in the wings, whilst the third, of 40 horse-power, is placed in a separate one-story building in the hollow of the square above mentioned, where are also the boilers, four in number. At the apex of the triangle forming the site, there is a range of stabling for twelve horses, loose boxes and infirmary, with harness room, keepers' house, hayloft, boiler room, and a large cart shed. The chimney stalk is a prominent object, not only in the immediate neighborhood, but for some distance around; it is octagonal in plan, 100 feet high, with ornamental bands, &c., in white glazed and colored bricks, and is surmounted by a handsome cast iron capital, weight about 6 tons, the foliage of which is picked out with gold. Adjoining this is a well 320 feet deep, for the supply of water to the works.

Architectural Iron Work in Richmond, Va.

The Richmond Engineer says: Messrs. Asa Snyder & Co., of the Richmond Architectural Iron Works, having the contract for the erection of the iron gallery of the State, War and Navy Department library at Washington, have put together at their establishment the third tier of the gallery, and in pursuance to information received to this effect, we recently visited their works. The tier consists of some eight alcoves, nine feet high, opening out upon a balcony, which rests on iron beams extended from the floor. The space between the four sides of the tier is about 24x34 feet, the flanges in the rotunda; the spandrels of the alcoves are sprung each from a fluted pilaster with highly ornamented capital connected with a panelled plate, so beautifully joined as to present the appearance of being incised. The spandrel plates are also beautifully ornamented in relief, and the railing of the balcony exhibits a most complicated pattern. The book shelves of the tier number about 400, and are bolted to the pilasters and arches of the alcoves, thus making the structure one of immense proportions. The chief merit of the work, however, is in the completeness of its workmanship.

We made a careful examination of some of the most difficult joints and were astonished at their closeness, and the evidences presented of what skilled mechanical labor could do with such material. We also saw in going through the establishment a magnificent iron front, which we learned was for the new Piedmont and Arlington building, corner of Ninth and Main streets.

An Injunction against Car Manufacturers.

A decree has just been signed by Judge Woodruff, of the United States Circuit Court of the Northern District of New York, in a suit involving the validity of eleven patents covering different parts of street cars. The decree grants a perpetual injunction against the manufacturers of street cars by John M. Jones & Co., and orders an accounting with the plaintiffs, John Stephenson & Co., which is set down for the 11th inst., before Judge Mason, in Utica.

The idea of street railways was first put into practical operation in New York City in 1831 by the construction of the New York and Harlem Railway. John Stephenson, who is now the largest manufacturer of street cars in the world, had then just completed his apprenticeship in the business of manufacturing the different kinds of omnibuses, and had started in business for himself. He was employed by the New York Railway Company to design and construct their cars. The first one finished was called the John Mason, and being a novelty a patent was taken out on it. Since that time the idea of tramways has been adopted in almost every civilized country, and almost everywhere that a tramway is to be found, Stephenson's cars are running on it. As the business of manufacturing increased, the different parts of the cars became the subjects of a large number of patents, many of which are on Mr. Stephenson's own inventions, and the most of which are now owned by him, he being now the sole proprietor of over fifty patents. These patents have nearly all been infringed upon by many of the street car manufacturers in this country, and the patentee has determined to enforce his rights. The suit, which was commenced in 1873, and has now been carried to a successful termination, is the first one brought in pursuance of this resolution.

The complaint, presented by the plaintiff's attorney, Louis W. Frost, Esq., describes the eleven patents, which cover: 1. A non-explosive lamp, consisting of a reservoir containing the oil, in which is set a well, tightly stuffed with wick. The oil has access to the wick only through a small hole in the well. Oscillation of the oil and consequent explosion are thus obviated. 2. The lamp box, the form of which is familiar to all passengers. 3. An improvement in bracing and trussing the car. 4. The lever door handle. This shuts and latches, or unlatches, and opens the door with a single motion. 5. An improved running gear. 6. The new form of elevated and ventilating roof. 7. The new form of platform, with appendages. 8. An improved wheel box. 9. The colored signal lights for distinguishing cars of different lines. 10. The double way, upper and lower, on which the doors run. 11. Improved axle box, pedestal and base plate.

The amount named in the prayer for relief, presented with the complaint, is \$100,000, but the actual amount to be recovered will depend on the accounting before Judge Mason.

American Graphite.

The only mines of graphite in the United States which have been successfully developed, and which yield a product of merchantable quantity, are located at Ticonderoga, New York, a small town on Lake Champlain, which is chiefly known on account of the revolutionary reminiscences connected with Fort Ticonderoga, the ruins of which are still to be seen near the village. Other deposits exist in different parts of New York State, in New Jersey, Pennsylvania, Virginia, Maryland and in most of the South Atlantic and Gulf States, but we believe that none of the many attempts which have been made to work them have been successful—at least, so far as we know, they have all been abandoned.

The mines at Ticonderoga are owned and worked by the American Graphite Company, whose headquarters in this city are at No. 24 Cliff street. Since 1863 the company have been engaged in the purification of plumbago on a large scale, and have succeeded in producing an article which, in some respects, is the best in the market. In 1867 Mr. Cyrus Butler assumed the management of the company. Up to that time the plumbago had been used chiefly for crucibles and stove polish, but many finer grades have since been produced which are admirably adapted to the special uses for which they are employed, including lubricators, paints for iron surfaces, railway axle grease, washes for foundry molds, &c. At the Ticonderoga works the graphite is prepared by a method peculiar to this company, and the refined plumbago which is sold, or consumed in the manufacture of lubricators, &c., by the company, is said to be in certain respects greatly superior to Ceylon plumbago. Between two bearing surfaces it forms a film of exceeding toughness, which fills every pore or abrasion of the metal, however minute, and makes a perfect and very lasting lubrication. The American Graphite Company manufacture a great many specialties, which have become widely and favorably known in the market. Among these may be mentioned the "perfect lubricator," the standard lubricating plumbago, plumbago railway grease, preservative plumbago paint, founder's wash, stove polish, crucibles, lead pencils, and plumbago for electrotyping, photographing, piano makers use, &c. They also do a considerable business in the preparation of special grades to order for specific uses. The company has fought its way to success against many and serious obstacles, and deserves well of the American public.

A London paper publishes the number of railway employees who are annually killed and injured on the different lines in Great Britain.

It appears that in the year 1872 no less than 1080 servants of the several companies were killed outright by accidents, while 27,340 were more or less seriously hurt and disabled. In 1873 this number was much larger, there having been 1300 killed. The number injured in that year gives a daily average of eighty persons.

International Exhibitions.

The London *Times* says: "The great Exhibition of 1851, held in London, was opened on the 1st of May, and remained open for payment for one hundred and forty-one days. The number of visitors was 6,039,195, and £424,322 was received for admission. The Exposition Universelle of 1855, at Paris, was opened on the 13th of May, and remained open two hundred days, Sundays included. The number of visitors was 5,162,330 and £128,000 was received for admission. The International Exhibition of 1862, in London, was opened on the 1st of May, and remained open one hundred and seventy-one days. The number of visitors was 6,211,103, and £408,530 was received for admissions. The Exposition Universelle of 1867, at Paris, was opened on the 1st of April, and remained open two hundred and seventeen days, Sundays included. The number of visitors was no less than 8,805,969, and £420,735 was received for admissions. The Universal Exhibition of 1873, at Vienna, was opened on the 1st of May, and remained open one hundred and eighty-six days, Sundays included. The number of visitors was 7,740,500, and £206,748 was received for admission. Thus the total number of visitors at the five great International Exhibitions was 32,950,097, a greater number than the entire population of the United Kingdom enumerated at the census of 1871, and £1,588,154 was received for admissions. The "Progress Medal," as it was termed in Vienna, for the greatest number of visitors in one day, belongs to the Exposition Universelle in Paris, in 1867, when 174,923 persons passed through the turnstiles on Sunday, the 27th of October. The Vienna Exposition was a 'good second,' with 135,673 on the closing day, Sunday, the 30th of November; Paris, in 1855, comes next, with 123,017, on Sunday, the 9th of September; then comes the London Great Exhibition of 1851, with what was then thought the extraordinary number of 109,915, on Tuesday, the 7th of October, four days before the close, and lastly London, in 1862, with 67,891, on Thursday, the 30th of October. We now wait for the great Exposition of Philadelphia in 1876."

Special Notices.

WANTED,

BY THE

Boston, Revere Beach and Lynn Railroad Company,

550 tons iron Rail, 40 lbs. to the yard, Fish Joints, Spikes, &c., for 9 miles road.
20,000 Ties, 5x6, six feet long.
2,500 Spruce Piles, from 20 to 35 feet long.
300 Oak Piles, 50 feet long.
350,000 feet Spruce Lumber, mostly dimensions varying from 3x6 to 10x12.

1 small Draw Bridge, 30 feet long.
8 first-class narrow gauge Passenger Cars.
3 " " " Open "
3 " " " Smoking "
3 Baggage Cars.
2 Box "
2 Platform "
4 first-class Locomotives, 10 to 12 tons weight.
2 moderate sized Ferry Boats, exclusively for passengers.

All of the above to be of the very best quality.
Apply at the Office of the Company,

38 Congress Street, Boston.

\$85,000

Will Purchase the Controlling Interest in an Established Manufacturing Company, situated in New England. A splendid chance for a business man or for investment.

Address, in first instance, CONTROL,
Office of The Iron Age, 10 Warren St., N. Y.

The Hudson River Spathic Iron Ore Company

Is now prepared to

Make Contracts for any Quantity of Ore, to be Delivered on the Wharf at

OAKHILL, Columbia Co., New York.
Orders may be sent to the Office of the Company,

1280 Broadway, N. Y.
H. T. LIVINGSTON, Pres't.
New York, March 1st, 1875.

Exposition, Santiago, Chili

A gentleman connected with the Hardware Trade, visiting the Exposition to be held at Santiago, Chili, September next, in charge of goods in the Hardware line, will make arrangements with other desirable parties to exhibit and represent their goods.

Address EXPOSITION,
Office of The Iron Age, 10 Warren St., N. Y.

EUGENE BISSELL, AUCTIONEER,
By BISSELL, WELLES & MILLET,
Successors to R. T. HARRL & CO.,
Store No. 15 Murray Street.

Our REGULAR SALES of HARDWARE, CUTLERY, FANCY GOODS, &c., will be held on TUESDAYS and FRIDAYS throughout the season.

CASH ADVANCES made on CONSIGNMENTS with additional charge.

A THOROUGH PRACTICAL MECHANIC wants a situation as draughtsman or charge of a machine shop. Can give the best of references.

Address ENGINEER, Box 5,
Office of The Iron Age, No. 10 Warren St., N. Y.

Special Notices.

INTER-STATE
Industrial Exposition.
CHICAGO, 1875.Will Open September 8th and Close
October 9th.ALL MANUFACTURERS, ARTISANS
and INVENTORSWishing to bring their products before the
GREAT WESTERN PUBLIC
should not fail to be represented.NO CHARGE
FOR SPACE OR POWER.Terms liberal to exhibitors and facilities first-class
in all respects.Applications received at any time. For blanks
and further information apply toJOHN P. REYNOLDS,
Secretary.Patent Bolt Cutting Machines.
Notice to Infringers.The undersigned give notice that they are the
owners of a patent for a Screw Cutting Die, issued
to John J. Grant, Oct. 24, 1871, and that all infringements
on said patent will be promptly prosecuted.Wiley & Russell Mfg. Co.
GREENFIELD, MASS., Feb. 12, 1875.

Wanted.

By an experienced man, a situation to superintend
the Practical Department of a Rolling Mill. One
who understands the working of such a mill, and
has a knowledge of production for all purposes; also
Bessemer steel. Has had large experience in man-
ufacturing works in England. Is a practical iron worker.
Refers to Mr. W. Gill, Managing Director Treseid
Iron Works, Middleborough, England; Mr. W. H.
Brown, Blackhouse, Upper Thorpe, Sheffield, Eng-
land. Address RICHARD JONES,
Care FOXELL & JONES, TROY, N. Y.

Wanted.

By an energetic man, a position with a first-class
house (iron preferred). Competent to take charge
and manage a business. Six years' experience as
manager at Charcoal and Anthracite furnaces. Thor-
oughly conversant with bookkeeping. First-class
references. Address BUSINESS,
P. O. Box 702 Pottsville, Pa.

Wanted.

By an experienced man who has a large acquaint-
ance with the wholesale and retail hardware and
house-furnishing merchants throughout the West, a
position as traveling salesman. Can furnish good
city references. Address P. A. C.,
Office of The Iron Age, 10 Warren St., N. Y.

TO LET.

The Light, Handsome Office
Now Occupied by
MESSRS. HEATON & DENCKLA.

Possession immediately.

HERMANN BOKER & CO.,
101 Duane Street, N. Y.

MERCANTILE AGENCY.

For the sale of Hardware or any Mercantile Busi-
ness. Parties desirous of going into business cannot
do better than to address this agency. Also clerks
secured, best of reference required. Parties
wishing clerks or assistants, please address this
agency. Hardware stores for sale and wanted:
Stamp enclosed insures answer.Address JOHN I. HARING,
Box 1633, Binghamton, N. Y.

HARDWARE.

FOR SALE in the best business part of Jersey
City, a first-class Tool and Hardware business,
Established about 25 years, and doing a fair business.
Apply to H. LUTIGEN,
57 Montgomery St., Jersey City.McHaffie Direct Steel Castings Co.
STEEL CASTINGS.Solid and Homogeneous, guaranteed to stand a Tensile
Strain of 25 tons per square inch. An invaluable substi-
tute for expensive WROUGHT IRON FORG-
INGS. Great Castings, and of great strength are
required. Office, cor. Fulton and Leaven Sts.
PHILADELPHIA.

Send for Circular and Price List.

Charcoal Blast Furnaces.

Having during the past 10 years constructed and put in
order many of the most successful Charcoal Blast
Furnaces in the country, and having a competent
corps of workmen constantly in my employ, I am enabled
to offer advantages in constructing or remodeling upon
the latest and most approved plans.
Estimations, Furnace Property made and reported
upon when solicited. Correspondence promptly attended
to.
J. M. WHITE, Engineer,
92 W. Alexander St., Rochester, N. Y.

MANUFACTURERS

desirous of introducing their goods to the British
and Continental Markets, are advised to insert
advertisements in the newspaper "IRON," pub-
lished every Saturday, at 99 Cannon Street,
London, E. C.
SCALE: First 3 lines, 3/-; every additional line, 10d.
Price, 6d. per Copy, or 30/- per annum, inclusive of
postage to the United States.

EUGENE BISSELL, AUCTIONEER.

By BISSELL, WELLES & MILLET,
Successors to R. T. HARRL & CO.,
Store No. 15 Murray Street.
Our REGULAR SALES of HARDWARE, CUT-
LERY, FANCY GOODS, &c., will be held on TUES-
DAYS and FRIDAYS throughout the season.
CASH ADVANCES made on CONSIGNMENTS with
additional charge.
A THOROUGH PRACTICAL MECHANIC wants a
situation as draughtsman or charge of a machine shop.
Can give the best of references.
Address ENGINEER, Box 5,
Office of The Iron Age, No. 10 Warren St., N. Y.
EUGENE BISSELL, AUCTIONEER.

By BISSELL, WELLES & MILLET,
Successors to R. T. HARRL & CO.,
Store No. 15 Murray Street.

Our REGULAR SALES of HARDWARE, CUT-
LERY, FANCY GOODS, &c., will be held on TUES-
DAYS and FRIDAYS throughout the season.

CASH ADVANCES made on CONSIGNMENTS with
additional charge.

A THOROUGH PRACTICAL MECHANIC wants a
situation as draughtsman or charge of a machine shop.
Can give the best of references.

Address ENGINEER, Box 5,
Office of The Iron Age, No. 10 Warren St., N. Y.

EUGENE BISSELL, AUCTIONEER.

By BISSELL, WELLES & MILLET,
Successors to R. T. HARRL & CO.,
Store No. 15 Murray Street.

Our REGULAR SALES of HARDWARE, CUT-
LERY, FANCY GOODS, &c., will be held on TUES-
DAYS and FRIDAYS throughout the season.

CASH ADVANCES made on CONSIGNMENTS with
additional charge.

A THOROUGH PRACTICAL MECHANIC wants a
situation as draughtsman or charge of a machine shop.
Can give the best of references.

Address ENGINEER, Box 5,
Office of The Iron Age, No. 10 Warren St., N. Y.

EUGENE BISSELL, AUCTIONEER.

By BISSELL, WELLES & MILLET,
Successors to R. T. HARRL & CO.,
Store No. 15 Murray Street.

Our REGULAR SALES of HARDWARE, CUT-
LERY, FANCY GOODS, &c., will be held on TUES-
DAYS and FRIDAYS throughout the season.

CASH ADVANCES made on CONSIGNMENTS with
additional charge.

A THOROUGH PRACTICAL MECHANIC wants a
situation as draughtsman or charge of a machine shop.
Can give the best of references.

Address ENGINEER, Box 5,
Office of The Iron Age, No. 10 Warren St., N. Y.

EUGENE BISSELL, AUCTIONEER.

By BISSELL, WELLES & MILLET,
Successors to R. T. HARRL & CO.,
Store No. 15 Murray Street.

Our REGULAR SALES of HARDWARE, CUT-
LERY, FANCY GOODS, &c., will be held on TUES-
DAYS and FRIDAYS throughout the season.

<div data-bbox="47

Trade Report.

Office of THE IRON AGE.

WEDNESDAY EVENING, March 10, 1875.

The past week has witnessed a general revival of speculative activity in Wall street, especially in the stock and gold markets. In the former the "bull clique" and the "bear clique" have both been very active, and much excitement has resulted from these operations. In the money market borrowers on call have paid rates varying from 2 to 4 per cent., and prime mercantile paper has been discounted at 5 @ 7 per cent.

In the stock market, as above noted, there has been an active speculation, with very heavy dealings at steadily advancing prices. The favorite stocks have been Pacific Mail, Western Union, Union Pacific, Northwestern, Lake Shore, St. Paul and Rock Island. The highest and lowest of to-day's quotations of active shares are given below.

The gold market has been very much disturbed, principally by the operations of the "bear clique" in the stock market, who bought nearly two millions of gold and locked it up, making borrowers pay as high as 3-16 of 1 per cent. per day for its use.

The following shows the daily range of the premium since our last report:

	Highest.	Lowest.
Thursday.	115%	114%
Friday.	115%	114%
Saturday.	115%	114%
Monday.	115%	114%
Tuesday.	115%	115%
Wednesday.	115%	115%

Government bonds are firm, but the dealings have been limited on account of the uncertainty which exists regarding the Treasury policy.

On Monday it was semi-officially announced from Washington that within the next few days the Treasury would call in \$30,000,000 5-30s on the sinking fund, which announcement will probably be made good on Thursday or Friday of this week. The call will probably be confined to registered bonds, but, in the absence of official information, this is still uncertain.

The reason for this is that nearly all the coupon bonds are held in Europe, and to redeem them would involve a heavy speculative shipment to foreign markets. This is evident contrary to Mr. Bristow's policy. How much of the \$30,000,000 gold, to be paid out by the Treasury, will remain at home, and how much will go abroad, remains to be seen. The prospect of a considerable increase in the gold reserves of the banks between this and June 1st should have a favorable effect upon general business, as it will insure steadiness and ease in the money market—the banks being at liberty to expand their credit to four times the amount of their gold and legal tender reserves.

The following trade movements for the week are shown as follows:

IMPORTS.	1873.	1874.	1875.
Total for week.	\$9,404,893	\$8,643,541	\$10,819,858
Prev. reported.	73,707,728	62,042,909	51,016,053
Since Jan. 1.	-\$93,475,621	\$70,686,452	\$66,829,911

Among the imports of general merchandise were articles valued as follows:

Quant.	Value.
1,873.	\$1,495
Antimony.	6
Anvils.	62
Brass.	9
Bronzes.	3
Chains and anchors.	366
Copper.	107
Cutlery.	160
Guns.	78
Hardware.	144
Iron, pig, tons.	17,808
Iron, other, tons.	1,000
Lead, pigs.	5,268
Metal goods.	484
Nails.	19
Needles.	23
Old metal.	266
Platina.	1
Pat caps.	4
Saddlery.	44
Steel.	4,068
Sterling.	42,738
Silverware.	55,307
Tin, boxes.	49,318
Tin (5,646 slabs).	84,018
Wire.	568
Zinc.	40,705

EXPORTS, EXCLUSIVE OF SPECIE.

1873.	1874.	1875.
Total for the week.	\$5,398,914	\$5,336,161
Prev. reported.	44,299,915	47,412,549
Since Jan. 1.	-\$49,668,389	\$52,750,510

EXPORTS OF SPECIE.

1873.	1874.	1875.
Total for the week.	\$598,761	
Previously reported.	13,567,041	

Total for January 1, 1875.

Same time in 1874.

Same time in 1873.

Government bonds closed firm at the following quotations:

Bid.	Asked.
U. S. Currency 6%.	119%
U. S. 6s 1861, reg.	119%
U. S. 6s 1881, cou.	120%
U. S. 1862, 5-20 reg.	116%
U. S. 5-20 1862, cou.	116%
U. S. 5-20 1861, reg.	117%
U. S. 5-20 1861, cou.	117%
U. S. 5-20 1862, cou.	118%
U. S. 5-20 1862, reg.	118%
U. S. 5-20 1862, cou.	118%
U. S. 5-20 1867, reg.	119%
U. S. 5-20 1867, cou.	119%
U. S. 5-20 1868, reg.	119%
U. S. 5-20 1868, cou.	119%
U. S. 10-40 reg.	120%
U. S. 10-40 1868, reg.	114%
U. S. 5s 1881, reg.	114%
U. S. 5s 1881, cou.	114%

These were the highest and lowest prices of stocks to-day:

Highest.	Lowest.
5.5%	5.2%
74%	73%
105%	104%
110%	104%
112%	112%
14%	14%
139%	139%
76%	75%
134%	134%
46%	45%
59%	57%
95%	95%
40%	39%
27%	27%
27%	27%
6%	6%
14%	14%
48%	48%
38%	33%
43%	43%

The following are the highest and lowest prices of stocks to-day:

Highest.	Lowest.
5.5%	5.2%
74%	73%
105%	104%
110%	104%
112%	112%
14%	14%
139%	139%
76%	75%
134%	134%
46%	45%
59%	57%
95%	95%
40%	39%
27%	27%
27%	27%
6%	6%
14%	14%
48%	48%
38%	33%
43%	43%

GENERAL HARDWARE.

Trade is better this week than last. Mail orders are coming in freely, and some houses have had all they could do to attend to customers in store. Merchants from New York State and Pennsylvania are in town in good number, and the West is also represented.

The following circular explains itself.

PHILADELPHIA, Feb. 25th, 1875.

As we learn that reports have been circulated that the compact made in New York last November, fixing uniform prices of Crayons and Chalk, does not even possess the confidence of the parties to it, and is liable at any time to be broken up, we deem it due to ourselves and to the trade to say that we have aimed, each of us, to sell goods since the agreement was made strictly within its letter and spirit, and we have not the slightest purpose of departing from it in future.

Each of the parties to our agreement will give such guarantees to their respective patrons against losses, caused by depression of prices of goods bought at compact rates, as they may desire.

We have also learned that our goods are being offered by second hands in lots of ten cases at our lowest price, viz., 13 cents per gross; and the inference being that such parties are acting as agents for some one or more of this combination that such inference is correct; that by express agreement no agencies or commissions, either direct or indirectly, exist, and if parties offer our goods as herein mentioned, we prefer African:

German Blued Grass Hooks are quoted from stock as follows:

No.	0	1	2
Per dozen.	\$2.75	3.00	3.37

The Wiebush & Hilger Hardware Co., agents for Seymour's Shears, quote their Straight Trimmers, discount 65 per cent.

The only goods in the line of Foreign Hardware are not affected by the change in the tariff is Percussion Caps. When the tariff was reduced these goods were not included, and have ever since been subjected to the additional duty of 10 per cent. The price as a consequence continues without change.

The following is an extract from a letter of Joseph Rodgers & Sons to Charles Pease, their agent in this city, under date of the 20th ult.:

At the late London sales so great was the increase in price of White Ivory (for which American buyers paid so dear), that it has now reached the value of African. African Ivory, as you are aware, contains the oil, is more durable, less likely to crack, and there is, consequently, more satisfaction in selling it. We are comelied to purchase the Alexandrian or Opaque Ivory, to suit some of our customers who prefer it, but we never, under any circumstances, recommend it. Below we give you the results of recent analyses, in support of our preference for African:

COMPOSITION OF IVORY.

African. Alexandria or East Indian.

Water.	16 4	17 1
Earthy matter.	41 6	48 4
Animal matter.	42 0	33 7
Paris.	100 0	100 0

Heaton & Denckla, Philadelphia, and 103 Duane street, New York, inform us that they have in stock a large assortment of English Trace Chafus brought in under former tariff, which will be sold at lowest market rates.

Trade in Nails continues light, although there is some improvement in the demand for these goods. Prices continue without change, and we quote 10d. \$3-35 @ \$3-40, according to quantity

nominally, 21½c. to 21¾c. as to quantity. The asking price for Lake Copper at the close is 21½c., while 21¾c. is offered. We copy from the *Mining Gazette*, of Houghton, Lake Superior, the following passage: "At the meeting of stockholders of the Quincy Mine, held at Boston, on Wednesday, March 3, 1875, Mr. Thos. F. Mason was elected president, and it was voted to remove the Eastern office back to New York, from which city it was taken three years ago. It was under Mr. Mason's administration of its affairs that the Quincy mine took its place among the best managed and most reputable industries in the land." The importance of being represented at New York principally on this coast is thus fully recognized. Of all the basic metals Copper is the one in which European bankers soonest take an interest, as was shown in summer last year, hence the necessity of having the Eastern office at the financial center of the country. Nothing of special interest seems to be going on in Copper in Europe, to judge from the absence of cable news from that quarter during the week. The leading printed review from London, dated Feb. 20, has the following passage: "Trade generally in Copper is decidedly quiet; there appears to be no fresh disposition to speculate, and consumers on the Continent and at home only buy from hand to mouth, and believe firmly in lower prices." The manufacturers of Copper are steady at the following quotations: New Sheathing Copper, 28c.; Bolts and Braziers, 30c.; Bronze and Yellow Metal Sheathing, 21c.; and Yellow Metal Bolts, 28c., net cash.

Tin.—The market here remains utterly devoid of life, while in Europe the receding from £90 to £88 10/-, telegraphed on March 5, has at first caused greater activity, but subsequently the market relapsed into dullness on the other side, according to the wording of the dispatch, but there was no pressure manifested to sell, the deliveries meanwhile continuing quite extensive. The large deliveries to consumption on the other side, which have been going on since the commencement of the year, while all the remaining metals were comparatively neglected, certainly speak in favor of the article, which below £90 may be deemed sufficiently safe by speculators and even capitalists, and as money remains easy on the other side, spring trade may cause it to advance steadily under the combined influence of a consumptive and speculative demand, despite the Australian shipments. **SINGAPORE**, March 5.—*By Cable.*—"Tin, New York parity, 20½c., gold," March 10.—"Tin, New York parity, 20½c., gold." We beg to remark that 20½c., gold, New York parity, is equal to \$22 per picul, prime cost, at the prevailing freight and exchange. These dispatches show that the market declined equal to 4c., gold, during the five days, closing weak. We quote, in gold, as follows: Straits, 21½c. @ 21½c.; L. & F., 20½c. @ 20½c.; English Refined, 21c. @ 21½c., and Banco, 25c. **Tin Plates.**—There has been a better demand since, although the dealings have been of a jobbing character merely. We quote, according to brand: I. C. Charcoal, \$9.75 @ \$10, gold, per box; I. C. Coke, \$7.62½ @ \$7.75; Coke Terne, \$7.25 @ \$7.50, and Charcoal Terne, \$8.75 @ \$9, all gold.

Lead.—The market has lacked activity, the principal holders being apparently unwilling to go on selling at the recently established low figures, deeming as they do the decline too precipitate and not warranted by the position of the article. They say that prospects for the warmer months are the reverse of discouraging, that a great deal more building will be done all over the country than last spring and summer, and that consumption will be quite able to cope with production, a growing one as the latter may be; that we have at least one adverse element pretty much out of the way—the large government surplus on hand last summer. We readily admit that the extreme dullness, nay, utter paralyzation, of the past six weeks was imminent to the maintenance of almost any kind of values if offered in the market, and that Lead, always difficult to move at the winter season, naturally suffered more than most other articles under the circumstances. These are their views, and we shall not attempt to dispute either their soundness or correctness. The sales have been confined to 25 tons Domestic at 5½c., gold, and a rumored one of an equal amount of San Andres Spanish, which we have been unable to verify, said to have been made at 6½c., gold. We quote the market quiescent at 5½c. to 5½c., gold, for Domestic, and 6½c. to 6½c., gold, foreign, nominally. The latter, we hear, is offering at 6½c., gold. We quote the manufacturers of Lead steady as follows: Bar 6½c., Pipe 9c., and Sheet 9½c., less 10 per cent, to the trade.

Selter and Zinc.—Domestic has gone on selling at 6½c., currency, and 6½c., currency, as to brand, in lots, to the extent of from 50 to 75 tons, and closes quiet within this range. In foreign nothing has transpired, either on the spot or to arrive. The quotations have, however, to be reduced to 7c. @ 7½c., gold. No later accounts have come to hand from Europe. Sheet Zinc is quiet at 9c. @ 9½c., gold, 9c. 9½c.

Antimony.—Has shared in the general activity. More of a stock has been accumulating in the meantime, and we can quote the same no higher than 12½c. @ 12½c., gold.

COAL.

Anthracite Coal continues to sell quite readily at retail, but at wholesale there is hardly anything doing. In the present condition of affairs we do not think there will be much of a demand for Coal before the 1st of April, although, in consequence of the Coal strike, supplies at many points are becoming very much reduced. A meeting of the Anthracite Coal Committee was held last Tuesday, March 2, to consider their plans for the future, and to establish a schedule of prices for Coal for the current term. After mature deliberation it was agreed that no reduction should be made in prices so long as the miners continue

on a strike. Should the miners return to work the following scale of prices would go into effect on the first day after the resumption of labor: Lump, \$4.40; Steamer, \$4.50; Grate, \$4.60; Egg, \$4.75; Stove, \$5.30; Chestnut, \$4.35. Following this agreement the Philadelphia and Reading Coal and Iron Company, and the Delaware, Lackawanna and Western Railroad Company, issued their respective prices of Coal for the current month, on condition that the men now on strike in the Schuylkill, Wyoming and Lehigh regions, resume work during the month. The Coal and Iron Company has issued its circular in regard to the prices of Coal for the month, and the conditions under which it is to be observed. It fixes its prices for hard and soft White Ash at \$3.90 per ton, Steamboat at \$4, Broken at \$4.10, Egg at \$4.25, Stove at \$4.30, and Chestnut at \$3.50. Some other qualities of Coal are 30 to 30 cents per ton higher. These are understood to be the prices of Coal at the shipping point, Richmond, and do not vary materially from prices for March, 1874. The Delaware, Lackawanna and Western Company announces its prices for Scranton Coal at Hoboken and Elizabethport, as follows: Lump, \$4.40; Steamboat, \$4.50; Grate, \$4.60; Egg, \$4.75; Stove, \$5.30; and Chestnut, \$4.35. Buyers not having contracts will be charged by the company 15 cents per ton more than above prices. From the printed rates of this company, the prices are apparently lower than those given for March last; this difference in favor of the buyer, however, is conditional upon the resumption of work by the miners now on a strike in the Schuylkill, Wyoming and Lehigh regions, of which there is no probability at present. Under present circumstances dealers will be compelled to pay at least 15 cents per ton more than the published prices, which will bring the rates for some sorts up to the schedule of last year, while others will show an advance. As yet in the Schuylkill region there seems little disposition among the men to go to work in a body, and in the Lehigh region, at Hazleton and vicinity, much bad feeling is reported. At Scranton, last week, a mass meeting of miners was held, and decided not to strike. Some other mining regions, it is believed, sympathize in this anti-strike feeling.

We quote as follows: Anthracite, \$4.75 @ \$6.30; Cumberland, \$6.25 @ \$6.50; West Virginia, \$7; James River Steam, \$6.25; James River Carbonite, \$9; Kanawha House, \$14.25; American Gas, \$7 @ \$7.25; American Cannel, \$12 @ \$14; Pennsylvania and Westmoreland, \$7.25; Murphy Run, \$7.40; Newburg Orrel, \$7.50; Sterling Ohio, \$12; Ince Hall, \$17 @ \$18; Liverpool House Cannel, \$18; Liverpool Gas, \$11; Newcastle Gas, \$7.50 @ \$8; Scotch, \$9. The Coal transported over the Cumberland Branch Railroad during the week ending March 6, 1875, amounted to 1620 tons, as against 1944 tons shipped in the corresponding period of last year, showing a decrease of 324 tons. Over the Cumberland and Pennsylvania Railroad, for the same period, the shipments were 18,764 tons, against 24,124 tons shipped in 1874, a decrease of 5360 tons. The aggregate amount of Cumberland Coal shipped by the various companies so far this year amounts to 168,714 tons.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending March 9, 1875:

Hardware.

Boker Hermans & Co.
Mds. pkgs., 16
Baldwin Bros. & Co.
Mds. pkgs., cks., 5
Eric Hallway Co.
Packages, 5
Fuller Bros.
Chains, cks., 58
Curry combs, cks., 1
Cutlery, cks., 4
Field A. & Co.
Mds. pkgs., 10
Pincers, 50
Friedmann & Lauterburg
Mds. pkgs., 3
Frith Edward
Cains, cks., 3
Harris S. E.
Cases, 5
Horizon John,
Cases, 1
Keay R. J. & Bro.
Cases, 1
Lennox E. S.
Bale ties, lots, 348
Lau & Garich.
Cases, 7
Langdon & Co.
Wire, pkgs., 10
Mason John W. & Co.
Wire rope, coils, 6
Morris L. W.
Cases, 1
Smith, Cohu & Co.
Packages, 8
Cans, 5
Avila, 5
Schuyler, Hartley & Gra-
ham.
Guns, cks., 8
Packages, 2
Squires Henry,
Cans, 1
Tompkins & Co.
Cases, 1
Tilston L. G. & Co.
Wire rope, coils, 1
Van Wart & McCoy,
Hoes, cks., 10
Avilis, 1
Packages, 7
Wickes & Higler Hwd.
Co.
Mds. pkgs., 4;
Ward A.
Mds. pkgs., 6
Order.
Cans, 9
Cases, 5
Cans, cks., 6
Lead, pkgs., 6

Metals.

Bruce & Cook.
Tin plates, bxs., 134
Corrill R. J.
Tin plates, bxs., 25
Dickerson J. S. & Co.
Zinc, cks., 55
Folger John B. & Co.
Scrap, brass, lbs., 211
Field A. & Co.
Zinc, cks., 20
Jackson R.
Bar tin, bds., 20
Naylor & Co.
Cases, 24
Bare, 3
Bundles, 37
Sanderson Geo. & Co.
Cans, 25
Bundles, 74
Sulzbacher & Hyman,
Bars, 2926
Order.
Bundles, 1469
Bars, 25
Scrap, tons, 100

Steel.

Benedict E.
Cases, 10
Drexel, Morgan & Co.
Bars, 1400
Lam. W. Bailey & Co.
Bundles, 2935
Cases, 1
Naylor & Co.
Cases, 24
Bare, 3
Bundles, 37
Sanderson Geo. & Co.
Cans, 25
Bundles, 74
Sulzbacher & Hyman,
Bars, 2926
Order.
Bundles, 1469
Bars, 25
Scrap, tons, 100

Metals.

Bruce & Cook.
Tin plates, bxs., 134
Corrill R. J.
Tin plates, bxs., 25
Dickerson J. S. & Co.
Zinc, cks., 55
Folger John B. & Co.
Scrap, brass, lbs., 211
Field A. & Co.
Zinc, cks., 20
Jackson R.
Bar tin, bds., 20
Naylor & Co.
Cases, 24
Bare, 3
Bundles, 37
Sanderson Geo. & Co.
Cans, 25
Bundles, 74
Sulzbacher & Hyman,
Bars, 2926
Order.
Bundles, 1469
Bars, 25
Scrap, tons, 100

OLD METALS, PAPER STOCK, &c.
The market for Old Metals, Rags, Paper Stock, and other junk materials, has improved considerably since last week, and a better feeling is apparent among dealers. Paper Stock, Rags and Grass Rope are in good demand, and are firm at quoted rates. The call from the mills has been more active, and stocks are getting somewhat reduced. The Old Metal market continues unchanged from the dullness previously noted. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, 6½c.; Lead, solid, 5½c.; Tea Lead, 4½c.; Zinc, 4½c. @ 4½c.; Pewter, No. 1, 18c.;

do., No. 2, 8c. @ 12c.; Spelter, 5c. @ 5½c.; Cast, do., 5½c.; Machinery, do., 5½c.; Rags, do., 5½c.; Canvas, Linen, 5c. @ 5½c.; do. Cotton, No. 1, 6c. @ 6½c.; No. 2, 5½c.; White, No. 1, 6½c.; No. 2, 4½c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 4½c. @ 5c.; Gunny Bagging, 1c.; Jute Butts, 1½c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 5c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, 5c. @ 5½c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 2½c. @ 2½c.

PHILADELPHIA.

PHILADELPHIA, March 9, 1875.

The market continues as at our last, somewhat more active than previously, but transactions greatly interfered with by protracted element weather and ice. The rise in prices customary with the opening of navigation will, it is likely, be greater this year, owing to the curtailment of production and the small stocks on hand. Some of the Schuylkill furnaces are procuring Coke from Western Pennsylvania, and as this can be delivered at about the same cost as Anthracite, and it is claimed that more iron can be made with Coke than Anthracite fuel, it is possible the use of it may be continued after the coal troubles end. The closing of the mills in the Shenango and Mahoning valleys will give an advance to prices for both finished Bars and Muck Iron. At Pittsburgh colored puddlers have been substituted in one mill for the strikers, and not without trouble. This will probably exasperate the striking puddlers, and make a compromise more difficult. If Railroad material there is a better feeling, and a fairly active demand exists, but principally for light rails. Scrap and Old Rails continue comparatively high, and the disposition to advance prices on all grades of iron just as fast as purchasers will bear it. No material advance can, however, be expected until navigation opens. Prices are quoted as follows:

No. 1 Foundry, \$28 to \$29; No. 2, \$26 to \$27; Gray Forge, \$25 to \$26.
Bars—2½c.
Rails, \$48 to \$53.
Old Rails, \$29 to \$30.
Scrap, \$30 to \$35 for No. 1 wrought.
The sales include, Pig Iron, 2500 tons; Foundry, Nos. 1 and 2 @ \$29; 1000 tons Gray Forge at furnace, private terms; 500 tons do., \$24 at furnace. Rails—1000 tons steel for Eastern roads said to be \$75 at works; 1300 tons iron 56's, Southern delivery, p. t.; 500 tons Hoboken, \$52; 200 tons 30 lb. p. t.; 1000 tons Muck Bar at \$42 to \$44, for Pittsburgh delivery; 1000 tons Old Rails, \$29.50; spot; 250 tons Baltimore delivery, \$31; Scrap—200 tons wrought, \$35.

PITTSBURGH.

PITTSBURGH, March 9, 1875.
Pig Iron.—It was thought early last month that the lock-out was about over, and that the puddlers would all resume work in a short time; hence, the majority of the mills bought more or less Pig, and sellers were enabled thereby to put up prices a couple of dollars per ton. For the last couple of weeks, however, the outlook, so far as the lock-out is concerned, has been no better than when it was first inaugurated, and the result has been a very decided falling off in the demand for raw iron. During the last week there was not a single ton of Mill Iron reported sold, and very little of any kind; and while there has been no quotable decline in prices as yet, the general tone of the market is decidedly weaker, and the reported stopping of all the furnaces at Cleveland and in the Shenango and Mahoning valleys is not without its effect in making matters, so far as the producing interest is concerned, still worse. It may be truthfully said that there is now no market for Mill Irons, at least so far as the furnaces in Western Pennsylvania and Eastern Ohio are concerned, as nearly all the puddling furnaces, as already noted, have been stopped, and the indications just now are that they will not be started up again until the puddlers are satisfied to go to work at the reduction; and, furthermore, it is not likely that the mills will take any more Pig until they are in actual need of it.

MANUFACTURED IRON.—There is little that is new or really important to be said in regard to the market for finished Irons. Possibly the action of the mills at Cleveland and in the Shenango and Mahoning valleys may have imparted a little more strength to the market, but as yet there has been no perceptible improvement, either as regards demand or prices. The mills here continue in operation, as they are still able to obtain sufficient Muck Bar and Scrap to keep them going, although but very few, if any of them, are working up to their full capacity, and in the present demoralized condition of affairs they are not disposed to go beyond supplying wants of regular customers. They are unwilling to contract ahead at current rates. Merchant Bars quotable at 3.25c. to 2.40c.

NAILS.—The Nail trade has undergone no quotable change during the past week. Orders are coming in pretty freely, although behind what they usually are at this season of the year; however, manufacturers do not complain so much about a lack of orders as they do in regard to prices, which is alleged, afford little or no margin for profit. Quotations may be fairly given at \$3, usual time, with 2 per cent. off for cash. Horse Shoes, \$5.25, cash, that is for 100 kg. lots, and Mule Shoes, \$6.75. The stock of Nails here is small, unusually so, and makers are resolved not to accumulate any in the present unsatisfactory condition of affairs.

MUCK BAR.—There is a continued steady demand; if anything, the market is firmer and prices higher, in consequence of the shutting down of the Western furnaces, some of which were engaged almost entirely in making Muck Bar. Quotable at \$42 to \$43, cash, and \$44 to \$46, 4 mos., according to quality.

SCRAP IRON.—There is a continued good demand for No. 1 Scrap, and notwithstanding the receipts continue liberal, there is no stock in hands of sellers, and prices are firm but unchanged—\$30 to \$33, 4 mos. Metal Scrap, however, is dull, as there is little or no demand for it. Scrap steel is in light stock and firm but unchanged.

STEEL.—Business is steadily increasing, all the mills are in operation, some of them working double time, and as stocks are known to be light both in the hands of jobbers and consumers, a good spring and summer trade is confidently expected. The only complaint to be heard now is in regard to prices, which are very low.

THE LOCK-OUT continues to be one of the leading topics of discussion, particularly in business circles, as it is attributed as being the principal cause of the depression that prevails in almost every branch of business in this city. Since the importation of colored puddlers by the proprietors of the Pittsburgh Bolt Works,

the matter has been stirred afresh, and it is reported now that quite a number of the old puddlers are willing to resume work at the reduction if they are guaranteed protection; indeed, the feeling is again gaining ground that the backbone of the strike is broken, and that the most of the mills will soon be able to secure all the puddlers they want at \$4.50. Furthermore, if the puddlers should continue to hold out, it is probable that other mills will follow the action of the Bolt Company, and import puddlers from elsewhere, and this, no doubt, has opened the eyes of the strikers and caused them to look at the matter from a different stand-point. It is almost certain that they will have to succumb, and that the manufacturers will sooner or later gain their point, P. S. It is reported to-day, 9th inst., that a compromise is about to be made between the boilers, rollers, heaters and manufacturers. It is about to be made on the basis of the sliding scale. It is evident that there is something up with a view of bringing the lock-out to a close, and it is hoped that it will be successful.

The Pittsburgh *Commercial* of March 6, says: The deadlock between the puddlers and employers still continues, and the effect is to stop all inquiries for metal, and we find ourselves this week compelled to make a report without a single sale of metal for mill use, and but a very limited quantity of Foundry Iron. The mills that have orders to fill still find some Muck Bar, and it seems that enough can be had to meet all demands. We are reported the following sales:

MUCK BAR.
200 tons muck bar, extra..... \$46.00—4 mos.
300 tons muck bar, extra..... 43.00—cash.
200 tons muck bar, extra..... 45.00—cash.
125 tons muck bar..... 46.00—4 mos.
100 tons muck bar..... private terms.

BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR

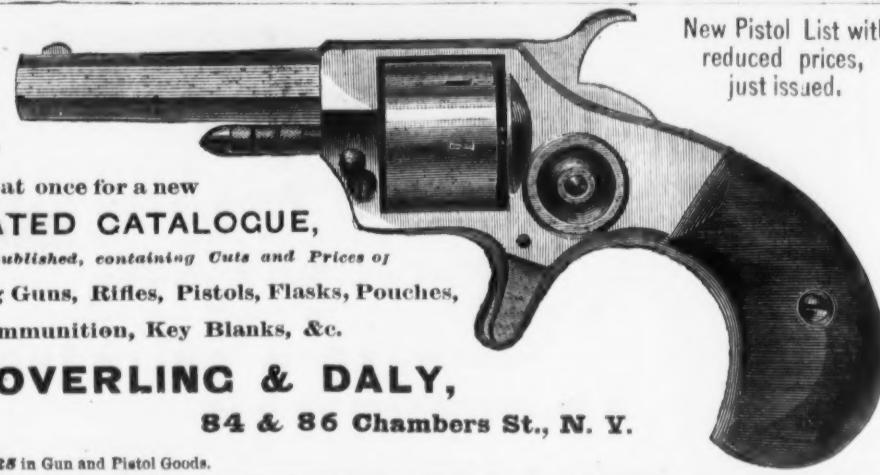
ORE.

50 tons No. 1 foundry..... \$27.00—4 mos.

50 tons No. 1 foundry..... 25.00—4 mos.

10 tons charcoal..... 25.00—cash.

LITTLE JOKER.
The Best
Cheap Pistol Made.



New Pistol List with
reduced prices,
just issued.

Send at once for a new
ILLUSTRATED CATALOGUE,

The most complete ever published, containing Cuts and Prices of
Breech and Muzzle Loading Guns, Rifles, Pistols, Flasks, Pouches,
Gun Material, Ammunition, Key Blanks, &c.

SCHOVERLING & DALY,

84 & 86 Chambers St., N. Y.

P. O. Box 5380, New York.

Lists will be sent only to **DEALERS** in Gun and Pistol Goods.



HERCULES IRON CUTTER.

No. 1, weight 16 lbs., cuts $\frac{3}{4} \times 2$ inch, or $\frac{1}{2}$ inch round or square. Price \$25.00
No. 2. " 165 " $\frac{3}{4} \times 3$ " " " " 50.00
No. 3. " 250 " $\frac{3}{4} \times 4$ " " " " 75.00

This is by far the most powerful Iron Cutter in use which can be worked by hand, having three times the capacity of any other machine which sells at the same price. The No. 3 machine occupies a space of 12×30 inches; when in use additional space must be had for the lever to work in. We send two sets of knives with each machine—one for square and flat, the other for round iron and steel. By using the knives suited to the work, it is possible to cut both round and flat. One man can cut the largest size iron named above, but two would be required for steady work. It does not take a minute to change the knives or to shift the machine from large to small sizes.

AUGUSTA, GA., March 3, 1875.
MILLERS FALLS CO.—Enclosed find draft for amount of invoice, January 7. We would have sent the amount before, but did not have an opportunity of trying the Iron Cutter until a few days ago. It is one of the best machines we ever saw.

Yours, truly, MOORE & CO.

Office of the ATHENS FOUNDRY AND MACHINE WORKS, ATHENS, GA., February 18, 1875.

H. L. PRATT, President.—Dear Sirs:—Enclosed find draft for amount made payable to your order by Messrs. Childs, Nickerson & Co., in payment for Iron Cutter. We have put our Cutter to good service, and find it cuts readily $1\frac{1}{2}$ round, and $3\frac{1}{2} \times \frac{1}{2}$ square iron. C. N. & Co. are pleased with theirs, say it will save many a blow and cold chisel in their iron house.

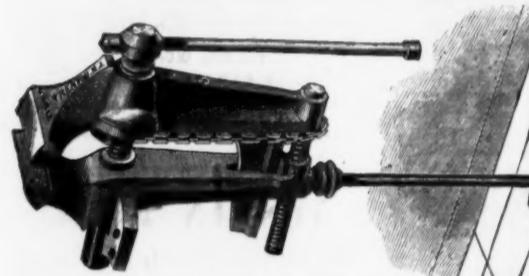
Truly yours, R. NICKERSON, Agent.

We make a satisfactory discount to dealers, and warrant the cutters to do all which we claim for them. Send for prices.

Millers Falls Company, No. 78 Beekman Street, New York,
Sole Proprietors and Manufacturers of the

Barber Self-Fitting Bit Braces, Millers Falls Vises,
Improved Angular and Ratchet Drilling Machines,
TUBE SCRAPERS, FAMILY TOOL CHESTS,
Patent Adjustable Tool Holders, Mitre Boxes, Ratchet
Braces, Breast Drills, etc.

The New Double Screw Parallel "Leg" Vise.



We are now ready to furnish, as the result of more than thirty years' experience, our latest style of Vise—the best yet made. It is stronger than any other, whether of Foreign or American make; always parallel, holding with a tighter grip. The jaws are of convenient shape for the work to be held in, and are made to get a better hold for the work, instead of the heavy, clumsy formed jaws of the cast iron Single Screw Vises of the common "parallel" type, and which, depending upon slideslides for preserving parallelism, can never be so well made as to hold very well.

Our New Vise holds all sizes of material, and is made of cast iron, the Leg Vise, of strength and lightness, fastening to the floor and bench, and at the same time greatly superior to it; is always perfectly parallel at all points of opening, and never gets out of line. Embodimenting the same general principle as the well known Chain Vise, so long made by us, and which has been the best Vise in the market for many years past, we have greatly improved metals for their manufacture, obtained so perfect a tool, that we now warrant these Vises for three years from date of manufacture stamped upon each.

The Jaws are of best Tool Cast Steel, welded on, file cut and properly hardened. The screws are made of the best quality of Steel, and are threaded throughout.

The lower screw maintains the parallel position of the two jaws, by having exact motion with the upper working screw through the connecting chain which regulates it. The chain is very accurately made of steel links and rivets, and having no strain on the work upon it, is therefore as durable as all the other parts.

Prices with Special Discounts to the Trade.
THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trade).

New York.—Messrs. J. CLARK WILSON & CO.—RUSSELL & ERWIN MANUFACTURING COMPANY.—Messrs. HORACE DURRILL & CO., Boston.—Messrs. GEORGE H. GRAY & DANFORTH, Philadelphia.—Messrs. JAMES C. HAND & CO., Baltimore.—Messrs. FISHER & NORRIS, Trenton, N. J.—Mr. W. H. COLE.

HOISTING Machinery
Mfd. by
CRANE BROS.
MFG. CO.,
Chicago.

The best machine
by far, for the trade
and the public.
"Champion."
Give universal satis-
faction.

Is highly recom-
mended by all dealers
that keep it.



Acknowledged the Best.

"Champion."
Everybody that has tried
the
"CHAMPION"
prefers it to any other
machine made.

Miller Iron Co.

Manufacturers of first-class
IRON SINKS,

With Patent Bolted Strainers, and Bell Trap with
Patent Stencil Trap Cleaner, the best in the market.
Send for circular and price list.



TREE BIRD HOUSE, No. 9.
Finished in White & Colors.



Issues Policies of Insurance after a careful Inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery,

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.

J. M. ALLEN Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec'y.

Board of Directors:

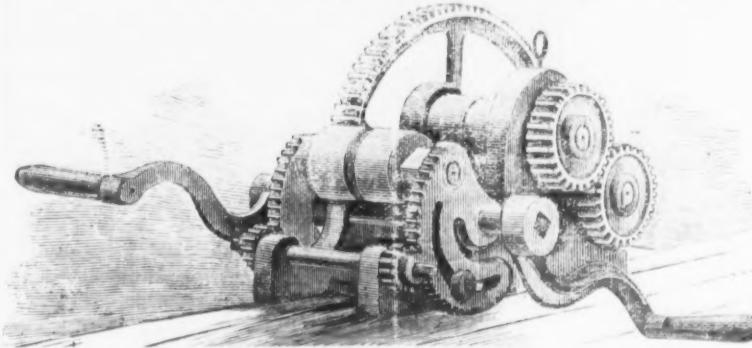
J. M. ALLEN, President. J. C. HENRY, Pres't Aetna Fire Ins. Co. FRANK W. CHENEY, Ass't Pres. Cheney Brothers Sub Manufacturing Co. CHARLES M. BROWN, Ch. of Beach & Co. J. M. MILLER, Adams Express Co. GEO. M. BARTHOLOMEW, Pres't Amer. Nat'l Bank. RICHARD W. H. JARVIS, Pres't Colt's Fire Arms Co. THOMAS O. ENDERS, Sec'y Aetna Life Ins. Co. EVERETT BRAINARD, Pres't Lockwood & Brainard Co.

THEO. H. BABCOCK, Manager,
New York Branch, No. 1 Park Place.

METALLIC BIRD HOUSE No. 4, finished in
White Enamel, 18 inches high, 14 $\frac{1}{2}$ by 10 $\frac{1}{2}$
base. Manufactured by
MILLER IRON COMPANY,
Providence, R. I., manufacturers of Plain and Ornamental Iron Work for Gardens, Lawns, Parks, Cemeteries, etc. Illustrated Catalogues sent free.

Guy C. Hotchkiss, Field & Co.,

85 First St., Brooklyn, E. D., and New York City.



Patented January 13, 1874.

This Machine is destined to supersede all Tire Benders now in use, especially for heavy work. The middle roller can be readily removed, and readjusted, thus allowing Tires to be withdrawn without difficulty after being bent. Fifth Wheel and Tires never slip while being bent in this Machine. One man can bend a Tire 3x1 without difficulty.

Manufacture Carriage Materials, Axles, Springs, Blacksmiths' Supplies, Bolts, Wood Work, Trimmings, &c.

IMPORTERS AND DEALERS IN

IRON AND STEEL.



FOR MELTING ALL KINDS OF METALS.

And Manufacturers of

Sunny Side Stove Polish.

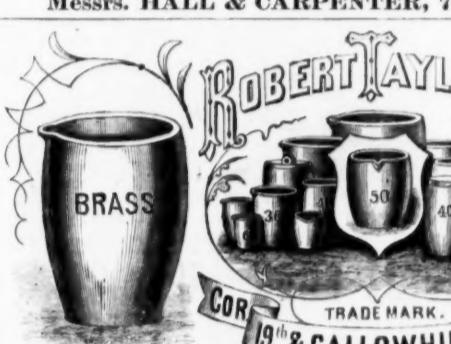
Lumber Pencils, Foundry Facings and Lubricating Plumbago.

STROW, WILE & CO.,

Nos. 1324, 1326, 1328, 1330, 1332 & 1334 Callowhill St., Phila.

GENERAL AGENTS:

Messrs. HALL & CARPENTER, 709 Market St., Phila.



BLACK LEAD CRUCIBLES

of all Sizes and Forms for melting

Steel, Brass, Gold, Nickel and all kinds of Metals.

Mr. Robert Taylor, who was for seven years the head of the late firm of Taylor, Strow & Co., and who is a practical mechanic, and familiar with all the details of the manufacture of Crucibles, attends personally to our manufacturing department. We would, therefore, respectfully solicit a continuance of the favors hitherto extended to him.

ROBERT TAYLOR & CO.,

No. 1900, 1902, 1904 & 1906 Callowhill, St., Philadelphia.

General Agents. MERCHANT & CO., 507 Market Street, Philadelphia.
PARK & CO., 122 Second Avenue, Pittsburgh, Pa.

NEW MODEL DERINGER REVOLVER.



22 Cal. 7 Shot.

An exact model of S. & W. No. 1 Revolver.

This arm is Half Nickel Plated, and is equal in style to the best arms in the country. Quality of workmanship and material first-class, and guaranteed in every respect.

Price less than any other Hinge Barrel Cartridge Revolver in the market.

Sole Agents, EDWARD K. TRYON, Jr. & CO., FIRE ARMS.
No. 19 North Sixth Street and No. 220 North Second Street, PHILADELPHIA.

NEW HAVEN NUT CO.,

MANUFACTURERS OF

HOT PRESSED NUTS

Of Superior Quality of all sizes, both

HEXAGON & SQUARE,

From $\frac{1}{4}$ inch to and including $1\frac{1}{2}$ inch Bolt.

Factory and Office, - - - - - WESTVILLE, CONN.

Pipe, Fittings, &c.

Thomas T. Tasker, Jr.

Stephen P. M. Tasker

MORRIS, TASKER & CO.,
PASCAL IRON WORKS, Philadelphia,
TASKER IRON WORKS, New Castle, Del.



Office, Fifth and Tasker Streets, Philadelphia.

Office and Warehouse, No. 15 Gold Street, New York.
Office and Warehouse, No. 36 Oliver Street, Boston.

MANUFACTURERS OF

WROUGHT IRON WELDED TUBES,

Plain, Galvanized and Rubber-Coated, for Gas, Steam and Water.

Lap-Welded Charcoal Iron Boiler Tubes.

Oil Well Tubing and Casing, Gas and Steam Fittings, Brass and Steam Fitters' Tools, Cast Iron Gas and Water Pipe, Street Lamp Posts and Lanterns, Improved Coal-Gas Apparatus, Etc.

Ecton Mills Genuine London
TURKEY EMERY.



ABBOTT & HOWARD, Agents for the United States.

81 John Street, New York.

35 Oliver Street, Boston.

BAILEY'S PATENT ADJUSTABLE PLANES.

Thirty different styles in

IRON AND WOOD.

80,000 ALREADY IN USE.

Smooth Planes,
Jack Planes,
Fore Planes,
Joiner Planes,
Block Planes,
Rabbet Planes,
Circular Planes.Carpenters,
Cabinet Makers,
Car Builders,
Carriage Makers,
Millwrights,
Wheelwrights,
All Use them.Manufactured by the STANLEY RULE & LEVEL CO.,
Factories: New Britain, Conn. Warehouses: 35 Chambers Street, New York.AMERICAN LOCK MFG. CO.,
Manufacturers of

FELTER'S

Locks & Latches,
ComprisingStore Door Locks, Night Latches,
Drawer, Desk and Pad Locks,
All of which are furnished withSMALL, FLAT, AMERICAN STERLING METAL KEYS,
Which are stronger than steel, and cannot be affected by rust, and will remain bright and clear under all ordinary circumstances.

A candid examination will convince the most unbelieving, that for simplicity, durability, convenience, and safety, they challenge comparison with any now before the public. Being made entirely by new and expensive machinery, especially constructed to manufacture them, they will rival the best made Locks in finish and perfect operation.

These Locks give perfect satisfaction, because they are the safest, cheapest and most durable Lock ever presented to the public, having thirty-five finely finished Brass Tumblers in each Door and twenty-eight in each Drawer Lock, each one being finely false notched.

Each tumbler bearing on the key at two different points while locking or unlocking, without the aid of springs, which cannot be said of any other patent Tumbler Locks in use.

THE LOCKS ARE FITTED TO THE KEYS,

And not the Keys to the Locks.

Hence Counterfeit Keys cannot be made.

For descriptive list and terms, address,

UNION NUT CO., Sole Agents,
78 Beckman Street, New York.

Branches Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.



New Patent "X" Razor Strap.

PATENTED DECEMBER 23, 1873.

This Strap, designated on our List as Letter "X," is of novel construction—is elastic, pleasantly yielding to the razor—gives a keen fine edge—is made of superior stock—is furnished at a low price—and gives universal satisfaction.

ITS PRICE SELLS IT.

BENJAMIN F. BADGER, Sole Manufacturer,
Badger Place, Charlestown, Mass.

Pipe, Fittings, &c.

National Tube Works Co.,
BOSTON, MASS. and MCKEESPORT, PA.,

MANUFACTURERS OF

Best Quality Lap Welded Iron Boiler Tubes,
STEAM AND GAS PIPE,

Artesian Oil and Salt Well Tubing and Casing,
With Patent Protecting Coupling;

Mack's Patent Injector for Feeding Boilers.

JAMES C. CONVERSE, President, MCKEESPORT.

WM. S. EATON, Treasurer, BOSTON.

New York Office and Warehouse 78 William cor. Liberty Street.

McNab & Harlin Mfg. Co.,
MANUFACTURERS OF

BRASS COCKS

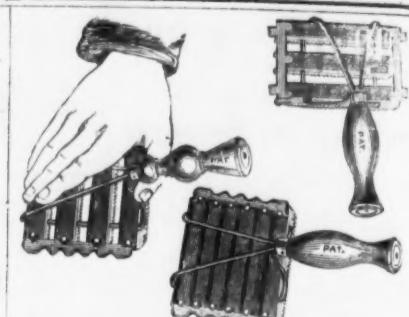
For STEAM, WATER and GAS.

Wrought Iron Pipe & Fittings, Plain and Galvanized PLUMBERS' MATERIALS.

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street, N. Y.



The Perfect Comb.
We call your attention specially to our new patent endless wire frame comb. The result of a long series of experiments, made with a view to meeting all the requirements of a Perfect Comb. It is better, stronger, and more durable than any ever before invented. The raised wire which gives what has never before been obtained, viz: a rest and brace for the thumb, in such a position that the hand cannot come in contact with the horse wire under the comb. The wire which runs from the shank over to the back of the front teeth, is straight and durable in a direction never heretofore attained, and at the same time serve as an extra handle; and when held by the fingers in connection with the raised shank the comb may be firmly gripped by the hand, held, and with much less fatigue—in short, it needs but a trial to vindicate its name: The Perfect Comb.

THE LAWRENCE COMB CO.
Factory and Office,
382 2d Ave., cor. 22d St., N. Y.

WILLIAMS WHITE & CHURCHILL
Successors to
MACKRELL & RICHARDSON MFG. COMPANY
Manufacturers of

Builders' Hardware,
Locks, Hinges, Hooks and Staples,
Awning Hooks, Meat Hooks, Pincers,
Champion Noiseless Pulleys,
CHAIN PULLEYS &c.
Factory, cor. Flushing and Nostrand Avenues
BROOKLYN.
Warehouse, 73 Warren St., N. Y.

WM. S. CARR & CO.
Sole Manufacturers of

Carr's Patent Plumbers' Goods
Pumps, Water Closets, Fountains,
Vases, &c.
OFFICE AND WAREROOMS
106, 108 & 110 Centre Street,
Factory, Matt Haven, New York.

J. AUSTIN & CO.,
168 Fulton Street, N. Y.,
Proprietors and Manufacturers of

WHEATCROFT'S SELF-ADJUSTING
CONTRACTORS

FOR HIGH & LOW PRESSURE STEAM HEATING APPARATUS FOR ALL CLASSES OF BUILDINGS.

Send for Illustrated Catalogue.

EATON & COLE.

Manufacturers of

Wrought Iron Pipe
Fittings, BRASS & IRON VALVES & COCKS

COCKS, TOOLS, &c.

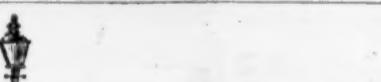
58 John Street, NEW YORK.

Sole Agency for the Pacific Coast for

Regester's Patent Gauge Cocks,

CONROY, O'CONNOR & CO.,

San Francisco, Cal.



R. D. WOOD & CO.,

Philadelphia, Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

Lamp Posts, Valves, &c.,

Mathew's Pat. Anti-Freezing Hydrants,

400 CHESTNUT STREET.

DRILLS,

Pipe Tongs,

Pipe Cutters,

Pipe Threaders,

Flue Brushes.

M. D. CONVERSE & CO.,

68 Park Place, N. Y.

DRILLS,

Pipe Tongs,

Pipe Cutters,

Pipe Threaders,

Flue Brushes.

WATER and GAS Gates, 3 to 48 inches

HYDRANTS.

Office and Warehouse, 75 & 77 Kilby St., Boston, Mass.

TURNED MACHINE SCREWS,

One-sixteenth to five-eighths diameter.

Heads and points to sample.

IRON, STEEL and BRASS.

Lyon & Fellows Mfg. Co.,

Cor. 1st and North 3d Streets, Williamsburg, N. Y.

GEORGE BARNES & CO.,

Manufacturers, Syracuse, N. Y.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.

Manufacturers, Retorts, &c.</

PENNSYLVANIA FILE WORKS.

Mill Saw File, Fine Bastard.

McCAFFREY & BROTHER.

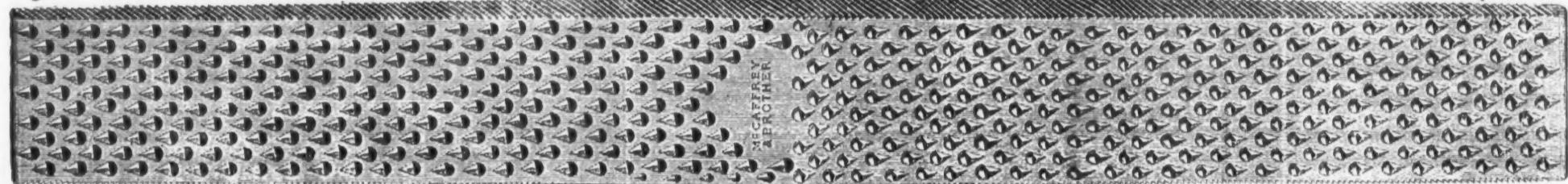
THE BEST FILE AND RASP IN THE MARKET.



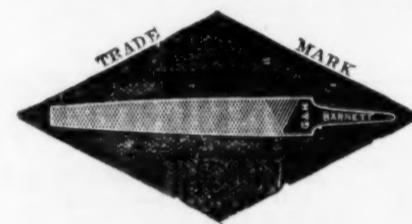
McCAFFREY & BROTHER,
Manufacturers of First Quality Hand-Cut FILES and RASPS only.

Nos. 1732, 1734 and 1736 North Fourth Street, PHILADELPHIA, Pa.

Double Horse Rasp.



SEND FOR ILLUSTRATED



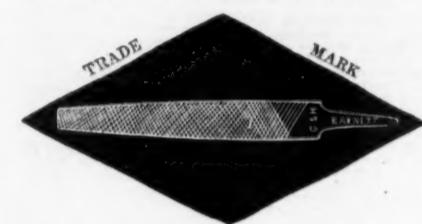
PRICE LIST.

BLACK DIAMOND FILE WORKS.

G. & H. BARNETT,

39, 41 & 43 Richmond Street, PHILADELPHIA.

SEND FOR ILLUSTRATED



PRICE LIST.

LINFORTH, KELLOGG & CO.,

Sole Agents for the Pacific Coast, 3 and 5 Front Street, San Francisco, Cal.

Plumbago Crucibles.

(From an Occasional Correspondent.)

One of the most striking characteristics of the present century is the improvement which is constantly being made in the processes and implements employed in the industrial arts. The methods and appliances with which the artisans of the last generation accomplished the best results of their handicraft would be too simple or too clumsy for use in these utilitarian days, when whatever is done must be accomplished with a minimum expenditure of energy and in the least possible time; hence, the improvement in the tools and implements used in the arts has been rapid and general. And yet there are some forms and shapes of articles that have been used without material change from the earliest historic times, and are the same now, at least in appearance, as they were six thousand years ago. I was especially struck with this in the form of certain crucibles for melting steel which I lately saw at the crucible works of Messrs. Robert Taylor & Co., of Philadelphia. The prototypes of these same crucibles may be seen in any picture copied from ancient Egyptian sculpture showing the metallurgical operations of that country before the pyramids were built. The crucible seems to be one of the few things which has not been improved in form during all the centuries it has been in use, and the reason for this is found in the fact that the crucible was made as perfect in the first instance as it was possible to make it.

While speaking of matters historical, I may say that the origin of the name crucible is interesting. The alchemists, whose unsuccessful efforts to transmute base metals into gold furnished the basis for the science of chemistry, were very superstitious philosophers. To insure success in their labors, they used to mark with the sacred emblem of the cross the deep earthen vessels in which they melted their metals and compounded their alloys, and those vessels thus acquired a name from the Latin noun *crucis*, which it holds to this day. Looking into the modern history of crucibles, we find that if their shape has not been altered from the earliest times, one of the great improvements in modern metallurgy has resulted from their use. Without them cast steel would be an impossibility, as would be many of the most important operations in the arts in which the metals are employed.

The works of Messrs. Robert Taylor & Co., which I lately had an opportunity of examining, will well repay a visit even from those who have no practical interest in the subject. The processes followed in the manufacture of crucibles are interesting in themselves, and I think your readers will derive pleasure from having them described in your columns. The works are situated on the corner of Nineteenth and Callowhill streets, Philadelphia, and are very extensive—as indeed, they need to be, since all branches of the business must be carried on under one roof. The materials used are clay and plumbago, but it is of the utmost importance that they should be of the right kind, or the finished crucibles would not withstand the very great heat to which they are subjected when used. Mr. Taylor imports a German clay which he considers the best known material for the purpose. This is mixed with Ceylon plumbago, which is first ground, sifted and bolted. After the materials are mixed in the right proportions the mass is shoveled into a pug mill, where it is well worked, passing out at the bottom. The well mixed mass is kept in dark closets as long as they can do without using it, the longer the better for quality. It would, no doubt, be best of all, if we could imitate the Chinese in making porcelain, and lay up lumps of crucible mass in the cellar for the next generation to use, as it goes on improving all the time.

As in all branches of the potter's art, so in crucible making the first operation is forming the vessel on the throwing lathe. This most ancient of all pieces of machinery was originally a circular table top, revolving on the top of a fixed post, and it was turned with one hand; while the other modified the shape of the lump of soft and wet clay that was dumped on the middle of the top. The next change was the table top fastened to the shaft, and a corresponding wheel or disk on the shaft near the floor, the whole revolving, so that a workman sitting near the table could push the lower wheel around with his foot, and so use both hands to work in the clay mass. Crucibles are sometimes made by hand on such a throwing lathe as last described, the foot moving the wheel or a lever. It was a beautiful sight to see a man dash a huge lump of clay on the lathe, and proceed to work it up into a large crucible, capable of melting 200 lbs. or more

of brass in the few moments I was looking on. It seemed so easy to make one, that I felt disposed to try it, but upon mature reflection I concluded not to do it.

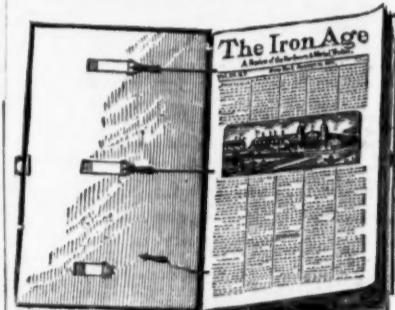
Crucibles for melting steel are smaller than those for brass and other metals which fuse at comparatively low temperatures. They hold only from 80 to 100 lbs. of metal, and are all made in molds of plaster of Paris, in a throwing machine called the jigger, and moved by the steam engine. The ball of moist clay mass, weighed out and worked by careful slapping, cutting and dashing into a suitable form, is thrown point foremost into the mold. The ball being in the mold, throwing wheel and mold are made to spin around with great velocity, when the workmen gradually lets down a former or profile of the inside of the crucible, made of a piece of strong iron and held by the machine, and which plunges into the whirling clay, until it spreads it evenly on the bottom and sides of the mold, giving the full shape and thickness of the crucible. The profile shapes the inside, the mold the outside, and the whole may be completed in a few minutes, so that one man can finish 10 to 30 in an hour. The freshly made crucible cannot be taken out of the mold at once or it would sink down by its own weight and softness into a lump of black dough; it is, therefore, taken to a frame, where there are hundreds of the same drying out a little before they can be opened and handled in the mold. This is the reason that it is necessary to have on hand hundreds of the massive plaster molds for crucibles of different sizes; and no trifling capital and space are locked up in plaster of Paris.

When the crucibles are taken out of the molds all irregularities in shape are carefully rectified, and they are then set aside in a warm space for air drying. Too rapid air drying, not drying enough, frost and sundry other dangers must be avoided, or the maker's reputation is in danger. The air dried crucibles are minutely examined for flaws and defects, and those that pass inspection are next put into saggers—circular bowls of burnt fire clay composition, with sides of about half the height of a crucible, and a little wider, so that a crucible being put into one, and another sagger inverted over it, the crucible is entirely covered from exposure to the direct flame of the furnace. Columns of these saggers, each pair containing a crucible,

are closely packed the interior of the furnace from the floor to the roof, filling a space of 12 feet high by 12 feet diameter, and still larger.

Great care is required in gradually raising the heat in the dozen fire places around the outer base of the furnace, and maintaining it day and night until the crucibles are well burned. Too much or too long a heat would ruin the crucibles in the kiln, while too little would render them liable to break in the steel furnace and do worse damage.

The warrooms of Messrs. Taylor & Co.'s establishment present a curious appearance, filled as they are with columns of nested crucibles rising from floor to ceiling. At first glance all appeared alike to me, but a closer inspection revealed differences in shapes and sizes. The brass crucible from No. 20 up to 300 had the usual puffed cheeks of crucibles, with a lip on the top to pour from. The steel pots, Nos. 40 and 50, had belled sides without lips, and were drawn closer together at the top. There was a host of smaller fry, dipping cups and skimming cups, stirrers, ladles, stools, &c., which, no doubt, are very useful in melting metals, but I cannot remember all their names and uses. Different trades, and even individual melters, seem to have their own peculiar favorite shape of cup or crucible, and there were cups and stirrers and melting pots of various shapes and sizes used at the U. S. Mint for melting gold and silver and cent metal. Mr. Taylor showed one pot in particular, in which more than \$100,000 worth of gold was melted at one time. I calculated how much that value of gold weighed, and found that it was over 5000 oz. Troy! I looked at him in doubt, and asked again, lest I had misunderstood. "Mr. Taylor do you say that they melt over 5000 oz. at once in one of those things made of clay and black lead? Why by that is nearly the weight of two barrels of flour?" "Yes," said he, "and more than that, they melt that amount often without the pot showing the least sign of giving way." Here was a mystery, that soft clay and greasy black lead should hold the weight of over 3500 pounds of gold in a perfectly fluid state, at a white heat, and not break down. "There is a good deal to learn," as King George said when he found out how the apple got into the dumpling.

Get Binders
FOR THE IRON AGE.

We have made arrangements to furnish Koch's PATENT BINDER, which we think altogether the best before the public, to our subscribers at the following very low rates—about the wholesale prices by the dozen.

Half Cloth \$1.00 each
(Cloth Back and Corners, with Morocco Paper Sides—a good serviceable Binder.)

Full Cloth 1.50
(Morocco Cloth Back and Sides.)

Half Roan 1.75
(Roan Back; Cloth Sides.)

Half Morocco 2.00
(Morocco Cloth Back and Corners; Cloth Sides.)

The above are all in black, which is the most serviceable color, with the exception of the Half Morocco, which are put up in a number of handsome shades. The name of the paper is stamped in gold on either side, and each Binder is furnished with loops by which it can be hung up against the wall as newspaper files are usually disposed of.

The Binders will each hold the twenty-six numbers in the form of a bound volume. They can be nicely inserted in two or three minutes by any boy of ordinary intelligence; and when the covers are full they can be either preserved in that shape as bound volumes of *The Iron Age*, or they can be emptied and used again. There is no possibility of their getting out of order, unless the cords, which are very strong, wear out, when anyone can easily replace them with a piece of fishing line or other strong twine. Subscribers who value the paper should order them at once, so as to keep the paper in good order.

On receipt of the price we will ship them, safely put up, by any express line or to any New York house to be packed. They are too large to be sent by mail.

HENRY DISSTON & SONS, Keystone Saw, Tool, Steel and File Works.

Front and Laurel Streets, Philadelphia.

Branch Works, Tacony, Philadelphia.

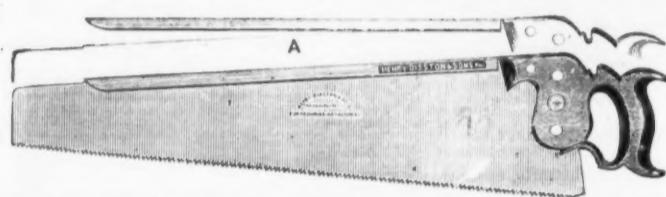
Branch House, Randolph & Market Streets, Chicago, Ill.

MANUFACTURERS OF

SHEET STEEL, and all Articles made from Sheet Steel.

SAWS OF EVERY DESCRIPTION.

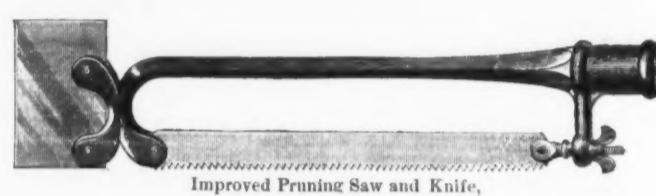
Also, FILES, TOOLS, Etc., and all kinds of Labor Saving Implements for keeping Saws in perfect order.



Hand Saw with Moveable Back—can be used with equal facility for either Hand or Back Saw.



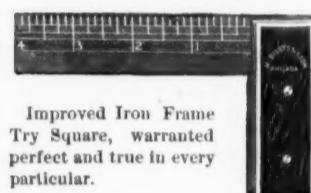
Pork Packers' Saw.



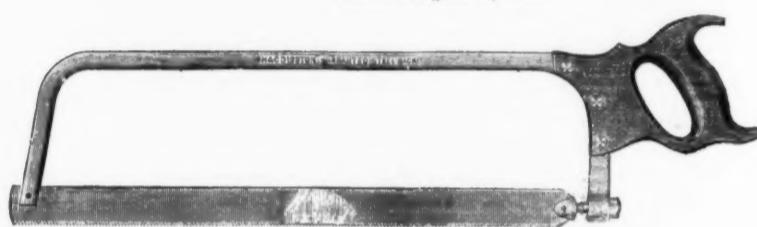
Improved Pruning Saw and Knife,
Patented August 29, 1873.



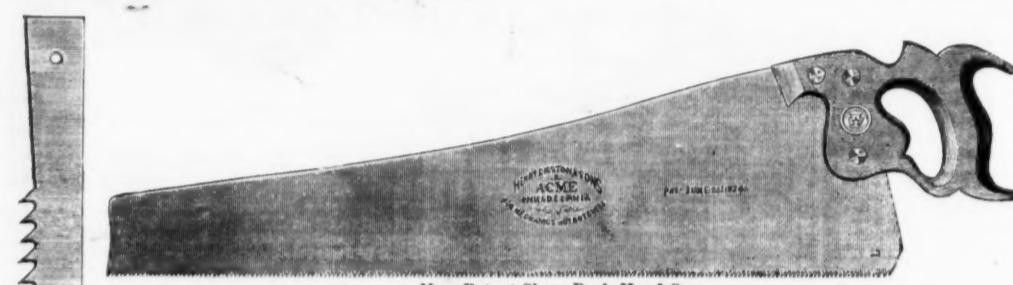
Mitre Box Saw.



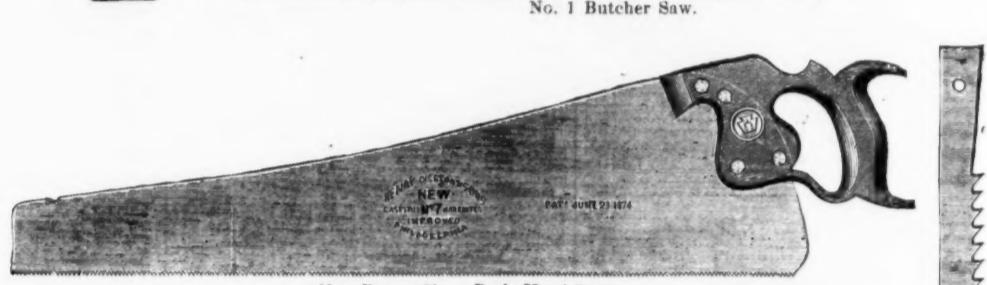
Improved Iron Frame Try Square, warranted perfect and true in every particular.



No. 1 Butcher Saw.



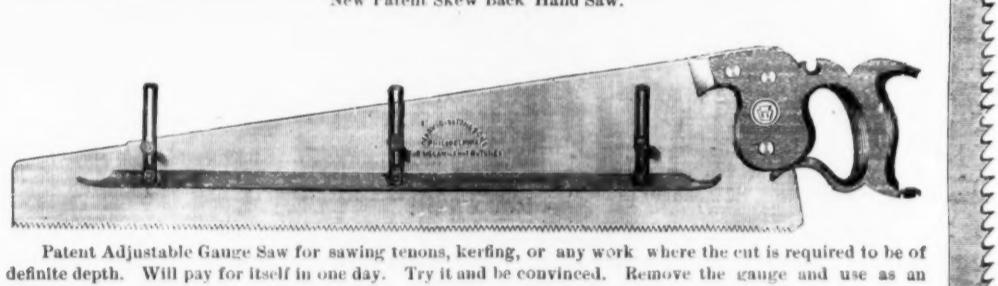
New Patent Skew Back Hand Saw.



New Patent Skew Back Hand Saw.



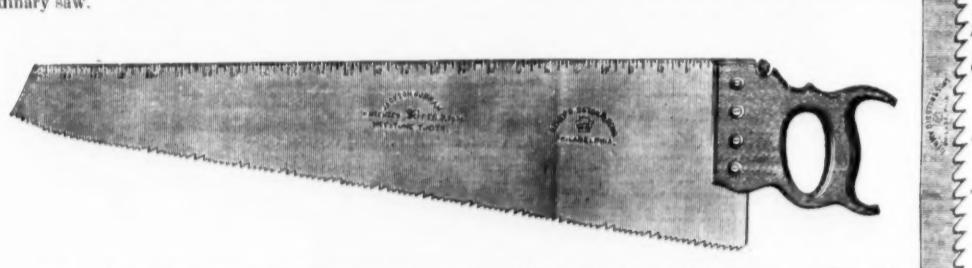
Hand Saw with adjustable handle. The thumb screws in the handle operate on the butt of the saw blade, and can be so adjusted as to give the blade any desired pitch.



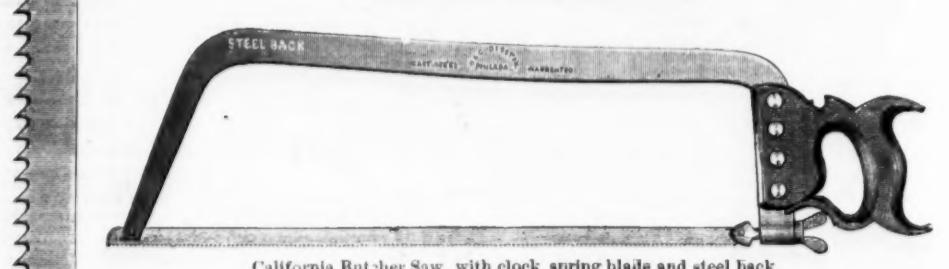
Patent Adjustable Gauge Saw for sawing tenons, kerfing, or any work where the cut is required to be of definite depth. Will pay for itself in one day. Try it and be convinced. Remove the gauge and use as an ordinary saw.



Game Cock Hand Saw—a perfect beauty.



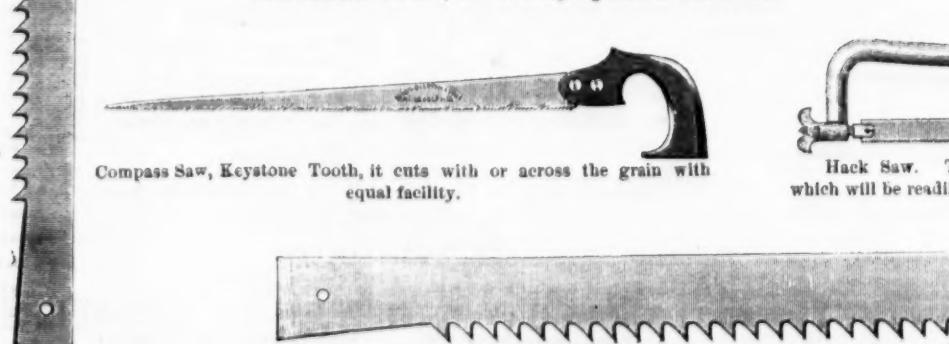
A cheap Saw, fully guaranteed. Six tools in one. Adapted to farmers' or plantation use. A Rip and Cross-Cut Saw, Square, Rule, Straight Edge and Scratch Awl combined.



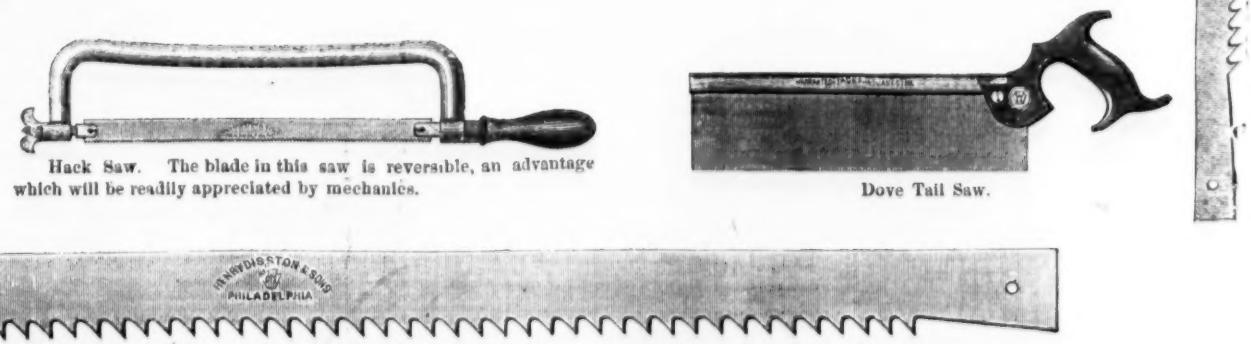
California Butcher Saw, with clock spring blade and steel back.



Table Saw.



Compass Saw, Keystone Tooth, it cuts with or across the grain with equal facility.



Hack Saw. The blade in this saw is reversible, an advantage which will be readily appreciated by mechanics.



Dove Tail Saw.



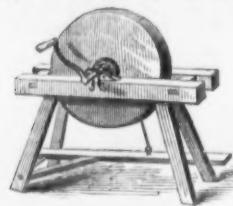
New York Wholesale Prices, March 10, 1875.

HARDWARE.

Traps.	
Newhouse.	dia 20 %
Peck, Stow & Wilcox.	dia 30 %
Blake's.	dia 30 %
McGee, Wood Chuck.	dia 25 %
Patent Checker Union Nut Co.	new list dia 25 %
" Round Wire.	# dia 18 net
" Case.	# dia 20
Trowels.	# dia 18 net
Lathrop's Brick and Plastering.	dia 10 %
Dixon's Brick.	dia 12 %
Rose's Brick.	gold, dia 10 %
Brady's Brick.	dia 10 %
Ward's Brick and Plastering.	dia 20 %
Garden.	dia 25 %
Trivets.	
Butter and Cheese.	dia 25 %
Trivets (Window).	dia 25 %
Nickel and Gilt.	per dozen \$16.00 @ 15 %
Vases.	
Trenton Glass, Solid Box.	16c
100 and over.	16c
Peter Wright's.	# dia 13 1/2, gold
Wilson's Solid Box.	dia 15 %
100 and up.	16c
Wilson's Parallel.	dia 30 %
Sargent's.	dia 50 & 100 %
Bethel & Union Parallel.	dia 25 %
Elmer & Norris' Double Screw Parallel.	dia 150 %
Trenton Parallel.	dia 15 %
Chase's Parallel.	dia 15 %
Stephens' Parallel.	dia 15 or 20 %
Bonney's Saw Fliers.	per dozen \$20- dia 25 %
Stearn's Saw Fliers.	per dozen \$20- dia 25 %
Wheel Barrows.	
Chase's (Chapman).	new list dia 10 %
Coal, Garden and Tools (Fugley & Chapman).	dia 25 %
Well Wheels.	revised list.
Wires.	
Brass and Copper.	dia 10 %
Bright and Annealed.	Nos. 0.06 18 25 45 60 72 80
"	19 26 33 40 47 54 61
Connered.	dia 20 %
Galvanized, Nos. 9 to 9.	dia 18 20 25 30 35 40 45 50
Galvanized, Nos. 9 to 18.	market list dia 10 to 15 %
Tinned.	dia 15 to 20 %
Cast Steel.	dia 20 %
Tinned Broom Wire.	dia 30 to 31 %
Galvanized Telegraph, Nos. 8 and 9.	# dia 9c on 9 1/2 %
Galvanized Telegraph, Nos. 11 and 12.	# dia 9c on 11c
Annulated Feno, Nos. 8 and 9.	# dia 45 or 57 %
Grape, " 10 to 14.	# dia 45 or 50 %
Fence Staples.	# dia 10 to 12
Stahl's Steel Wire.	# dia 70 to 100 %
Judd's Picture Wire.	# dia 50
Wrenches.	
American Adjustable.	dia 65 %
Baxter's Adjustable.	dia 20 %
Diagonal.	dia 20 %
Collins & Co.	dia 45 %
Cox's Genuine.	# dia 45 & 5 %
" Pattern.	# dia 200 & 250 %
" (Malleable).	# dia 200 & 250 %
Lindsay's Patent.	dia 25 %
Tate's Pattern.	dia 20 %
Davis' Patent.	new list dia 25 %
Baird & Co.'s Patent Combination.	# dia 250 & 250 %
" Merck's Pattern.	# dia 250 & 250 %
" Briggs' Patent.	# dia 150 & 180 %
Aiken's Pocket.	per dozen \$10.00- dia 4 & 10 %
Wrimers.	Less than 2 doz. 2 doz lots
Pratt's.	# dia 100- dia 120
Reliance.	# dia 120
Universal-Extra.	# dia 140
Novelties.	# dia 60
Sherman's.	# dia 60
Eureka (Friction).	# dia 60

TIN WARE AND TRIMMINGS.		
STAMPED TIN WARE, dia 5 %.		
COMMON STAMPED WARE, &c.		
Bucket Covers.		
Quart.	1 2 3 4	
" 4 5 6 7 8 9 10 11 12	7.11-16	
Per gross.	\$2.00 2.60 3.40 4.20 5.55	
Quart.	8 9 10	
" 11 12 13 14 15 16 17 18	11.96-20	
Per gross.	\$2.50 3.00 3.50 4.00	
Cake Box Covers.		
Small.	Medium.	Large.
Inch.	12c 18c 24c	
Per gross.	\$1.50 2.00 2.50	
Pot Covers.	18c 24c	
Quart.	9 10 11 12 13 14 15 16 17 18	10.50
Per gross.	\$1.50 2.00 2.50 3.00 3.50 4.00	
Deep Plat. Plates.	10 11 12 13 14 15 16 17 18 19	10.50
Per gross.	\$1.50 2.00 2.50 3.00 3.50 4.00	
Jelly Cake Pans.	9 10 11 12 13 14 15 16 17 18	10.50
Per gross.	\$1.50 2.00 2.50 3.00 3.50 4.00	
Coffee Pot Covers.	10 11 12 13 14 15 16 17 18 19	10.50
Plain.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	6.75-15
Per gross.	\$1.50 2.00 2.50 3.00 3.50 4.00	
Common Iron.	1 to 2 in. 2 to 3 in. 3 to 4 in. 4 to 5 in. 5 to 6 in. 6 to 7 in. 7 to 8 in. 8 to 9 in. 9 to 10 in. 10 to 11 in. 11 to 12 in. 12 to 13 in. 13 to 14 in. 14 to 15 in. 15 to 16 in. 16 to 17 in. 17 to 18 in. 18 to 19 in. 19 to 20 in. 20 to 21 in. 21 to 22 in. 22 to 23 in. 23 to 24 in. 24 to 25 in. 25 to 26 in. 26 to 27 in. 27 to 28 in. 28 to 29 in. 29 to 30 in. 30 to 31 in. 31 to 32 in. 32 to 33 in. 33 to 34 in. 34 to 35 in. 35 to 36 in. 36 to 37 in. 37 to 38 in. 38 to 39 in. 39 to 40 in. 40 to 41 in. 41 to 42 in. 42 to 43 in. 43 to 44 in. 44 to 45 in. 45 to 46 in. 46 to 47 in. 47 to 48 in. 48 to 49 in. 49 to 50 in. 50 to 51 in. 51 to 52 in. 52 to 53 in. 53 to 54 in. 54 to 55 in. 55 to 56 in. 56 to 57 in. 57 to 58 in. 58 to 59 in. 59 to 60 in. 60 to 61 in. 61 to 62 in. 62 to 63 in. 63 to 64 in. 64 to 65 in. 65 to 66 in. 66 to 67 in. 67 to 68 in. 68 to 69 in. 69 to 70 in. 70 to 71 in. 71 to 72 in. 72 to 73 in. 73 to 74 in. 74 to 75 in. 75 to 76 in. 76 to 77 in. 77 to 78 in. 78 to 79 in. 79 to 80 in. 80 to 81 in. 81 to 82 in. 82 to 83 in. 83 to 84 in. 84 to 85 in. 85 to 86 in. 86 to 87 in. 87 to 88 in. 88 to 89 in. 89 to 90 in. 90 to 91 in. 91 to 92 in. 92 to 93 in. 93 to 94 in. 94 to 95 in. 95 to 96 in. 96 to 97 in. 97 to 98 in. 98 to 99 in. 99 to 100 in. 100 to 101 in. 101 to 102 in. 102 to 103 in. 103 to 104 in. 104 to 105 in. 105 to 106 in. 106 to 107 in. 107 to 108 in. 108 to 109 in. 109 to 110 in. 110 to 111 in. 111 to 112 in. 112 to 113 in. 113 to 114 in. 114 to 115 in. 115 to 116 in. 116 to 117 in. 117 to 118 in. 118 to 119 in. 119 to 120 in. 120 to 121 in. 121 to 122 in. 122 to 123 in. 123 to 124 in. 124 to 125 in. 125 to 126 in. 126 to 127 in. 127 to 128 in. 128 to 129 in. 129 to 130 in. 130 to 131 in. 131 to 132 in. 132 to 133 in. 133 to 134 in. 134 to 135 in. 135 to 136 in. 136 to 137 in. 137 to 138 in. 138 to 139 in. 139 to 140 in. 140 to 141 in. 141 to 142 in. 142 to 143 in. 143 to 144 in. 144 to 145 in. 145 to 146 in. 146 to 147 in. 147 to 148 in. 148 to 149 in. 149 to 150 in. 150 to 151 in. 151 to 152 in. 152 to 153 in. 153 to 154 in. 154 to 155 in. 155 to 156 in. 156 to 157 in. 157 to 158 in. 158 to 159 in. 159 to 160 in. 160 to 161 in. 161 to 162 in. 162 to 163 in. 163 to 164 in. 164 to 165 in. 165 to 166 in. 166 to 167 in. 167 to 168 in. 168 to 169 in. 169 to 170 in. 170 to 171 in. 171 to 172 in. 172 to 173 in. 173 to 174 in. 174 to 175 in. 175 to 176 in. 176 to 177 in. 177 to 178 in. 178 to 179 in. 179 to 180 in. 180 to 181 in. 181 to 182 in. 182 to 183 in. 183 to 184 in. 184 to 185 in. 185 to 186 in. 186 to 187 in. 187 to 188 in. 188 to 189 in. 189 to 190 in. 190 to 191 in. 191 to 192 in. 192 to 193 in. 193 to 194 in. 194 to 195 in. 195 to 196 in. 196 to 197 in. 197 to 198 in. 198 to 199 in. 199 to 200 in. 200 to 201 in. 201 to 202 in. 202 to 203 in. 203 to 204 in. 204 to 205 in. 205 to 206 in. 206 to 207 in. 207 to 208 in. 208 to 209 in. 209 to 210 in. 210 to 211 in. 211 to 212 in. 212 to 213 in. 213 to 214 in. 214 to 215 in. 215 to 216 in. 216 to 217 in. 217 to 218 in. 218 to 219 in. 219 to 220 in. 220 to 221 in. 221 to 222 in. 222 to 223 in. 223 to 224 in. 224 to 225 in. 225 to 226 in. 226 to 227 in. 227 to 228 in. 228 to 229 in. 229 to 230 in. 230 to 231 in. 231 to 232 in. 232 to 233 in. 233 to 234 in. 234 to 235 in. 235 to 236 in. 236 to 237 in. 237 to 238 in. 238 to 239 in. 239 to 240 in. 240 to 241 in. 241 to 242 in. 242 to 243 in. 243 to 244 in. 244 to 245 in. 245 to 246 in. 246 to 247 in. 247 to 248 in. 248 to 249 in. 249 to 250 in. 250 to 251 in. 251 to 252 in. 252 to 253 in. 253 to 254 in. 254 to 255 in. 255 to 256 in. 256 to 257 in. 257 to 258 in. 258 to 259 in. 259 to 260 in. 260 to 261 in. 261 to 262 in. 262 to 263 in. 263 to 264 in. 264 to 265 in. 265 to 266 in. 266 to 267 in. 267 to 268 in. 268 to 269 in. 269 to 270 in. 270 to 271 in. 271 to 272 in. 272 to 273 in. 273 to 274 in. 274 to 275 in. 275 to 276 in. 276 to 277 in. 277 to 278 in. 278 to 279 in. 279 to 280 in. 280 to 281 in. 281 to 282 in. 282 to 283 in. 283 to 284 in. 284 to 285 in. 285 to 286 in. 286 to 287 in. 287 to 288 in. 288 to 289 in. 289 to 290 in. 290 to 291 in. 291 to 292 in. 292 to 293 in. 293 to 294 in. 294 to 295 in. 295 to 296 in. 296 to 297 in. 297 to 298 in. 298 to 299 in. 299 to 300 in. 300 to 301 in. 301 to 302 in. 302 to 303 in. 303 to 304 in. 304 to 305 in. 305 to 306 in. 306 to 307 in. 307 to 308 in. 308 to 309 in. 309 to 310 in. 310 to 311 in. 311 to 312 in. 312 to 313 in. 313 to 314 in. 314 to 315 in. 315 to 316 in. 316 to 317 in. 317 to 318 in. 318 to 319 in. 319 to 320 in. 320 to 321 in. 321 to 322 in. 322 to 323 in. 323 to 324 in. 324 to 325 in. 325 to 326 in. 326 to 327 in. 327 to 328 in. 328 to 329 in. 329 to 330 in. 330 to 331 in. 331 to 332 in. 332 to 333 in. 333 to 334 in. 334 to 335 in. 335 to 336 in. 336 to 337 in. 337 to 338 in. 338 to 339 in. 339 to 340 in. 340 to 341 in. 341 to 342 in. 342 to 343 in. 343 to 344 in. 344 to 345 in. 345 to 346 in. 346 to 347 in. 347 to 348 in. 348 to 349 in. 349 to 350 in. 350 to 351 in. 351 to 352 in. 352 to 353 in. 353 to 354 in. 354 to 355 in. 355 to 356 in. 356 to 357 in. 357 to 358 in. 358 to 359 in. 359 to 360 in. 360 to 361 in. 361 to 362 in. 362 to 363 in. 363 to 364 in. 364 to 365 in. 365 to 366 in. 366 to 367 in. 367 to 368 in. 368 to 369 in. 369 to 370 in. 370 to 371 in. 371 to 372 in. 372 to 373 in. 373 to 374 in. 374 to 375 in. 375 to 376 in. 376 to 377 in. 377 to 378 in. 378 to 379 in. 379 to 380 in. 380 to 381 in. 381 to 382 in. 382 to 383 in. 383 to 384 in. 384 to 385 in. 385 to 386 in. 386 to 387 in. 387 to 388 in. 388 to 389 in. 389 to 390 in. 390 to 391 in. 391 to 392 in. 392 to 393 in. 393 to 394 in. 394 to 395 in. 395 to 396 in. 396 to 397 in. 397 to 398 in. 398 to 399 in. 399 to 400 in. 400 to 401 in. 401 to 402 in. 402 to 403 in. 403 to 404 in. 404 to 405 in. 405 to 406 in. 406 to 407 in. 407 to 408 in. 408 to 409 in. 409 to 410 in. 41	

Grindstones, Emery, &c.

Walter R. Wood,
GRINDSTONES.ROLE AGENT OF THE
BEREA STONE CO., of Ohio,
NOVA SCOTIA and other brands.
283 & 285 Front Street, New York.

Grindstones.

AMHERST,
INDEPENDENCE,
LAKE HURON,
AND BEREA.Also Scythe Stones.
WORTHINGTON & SONS, Mfrs.,
North Amherst, Ohio.OIL STONE.
BOYD & CHASE,
388 to 406 East 107th St., N. Y.
The largest manufacturers in the world of
Arkansas, Washita and Genuine
Turkey Oil Stone.Also, Hindostan, & *nd* other Stone.
Send for circular. Orders solicited from the trade.

EMERY WHEELS AND MACHINERY

Upon which to run the same, of all kinds.

EMERY TRADE MARK. DIAMOND

Emery Cloth, Tools,

Mill Stone Oil Stones,

CEMENT. Soapstone Register Borders.

For particulars, address,

UNION STONE CO.,

6 Exchange and 26 Devonshire Streets, Boston, Mass.

THE LEHIGH VALLEY
Emery Wheel Co.,
Weissport, Penn.
Manufacturers of
"LEHIGH" Emery
Wheels and Machines.
Send for Circulars.THE
Rocky Mountain Vermilion Paint

A "Nature's Compound" of Copper, Mercury, Lead and Iron. A pure Oxide of Metal, containing no earthy matter, hence we claim, and are prepared to prove that it is the best and Cheapest Paint in the market. Properly mixed, we will guarantee it to cover double the surface and to outlast any ordinary paint. It will not Peel, Scale, Crack or Blister, though subjected to high degrees of heat. It will effectively prevent the Corrosion of Metals, even in salt ocean water, and is superior to any other paint for any and all purposes for which paint is required. Please send for circulars.

All orders should be addressed, Wm. H. Corey.

General Agent, 21 Sabine St., Providence, R. I.

Vine Medallion B. Burner.

L. COES'
Genuine Improved Patent
SCREW WRENCHES.Manufactured by
L. COES & CO.,
Worcester, Mass.Established in 1839.
Registered March 31, 1846.We invite the particular attention of the
trade to our New Straight Bar Wrench, *welded*,
full size of the larger part of the so called
"reinforced or jog bar." Also our ordinary jaw,
made with ribs on the inside, having a full
bearing on the front of bar (see sectional view),
making the jaw fully equal to any strain the
bar may be subjected to.These recent improvements in combination
with the nut inside the ferrule firmly screwed
up flush, against square, solid bearings (that
cannot be forced out of place by use), verifies
our claim that we are manufacturing the
strongest Wrench in the market.We would also call attention to the fact,
that in 1869 we made several important im-
provements (secured by patents), on the old
wrench previously manufactured by L. & A.
G. Coes which were at once closely imitated
and sold as the "Genuine Wrench" by certain
parties who seem to rely upon our improvements
to keep up their reputation as manufacturers,
and although the fact of their imitating our
goods may be good evidence that we manufacture
a superior Wrench, we wish the trade may
not be deceived on the question of originality.
Trusting the trade will fully appreciate our
recent efforts, both in improvements on the
Wrench and in the adoption of a Trade Mark,
we would caution them against imitations.
None genuine unless stamped.

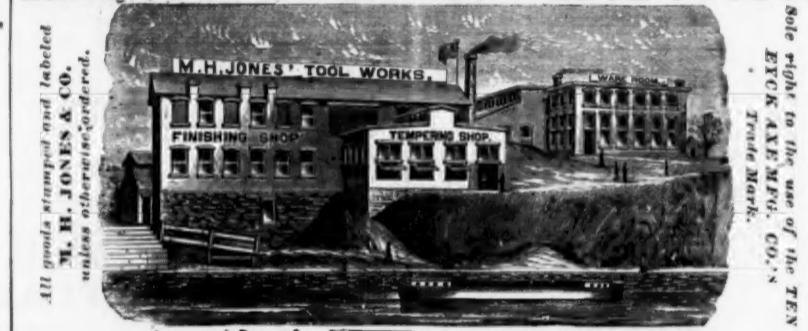
"L. COES & CO."

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.
HORACE DURRIE & CO., Sole Agents.

M. H. Jones.

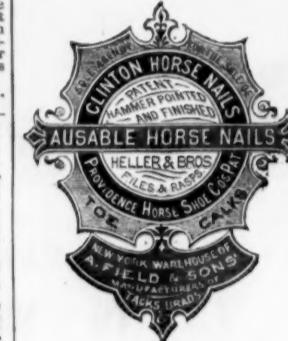
M. H. JONES & CO.,
COHOES, Albany Co., N. Y.

Manufacturers of AXES AND EDGE TOOLS.



Manufacturers of the LEHIGH AXE & CO.'S GOODS

HORACE DURRIE & CO., Agents, 97 Chambers and 81 Reade Streets, N. Y.

Ausable Horse Nail Co.
MANUFACTURERS OF
HAMMERED,
Hammer Pointed, Polished & Blued
HORSE NAILS,
FROM BENZON IRON.Orders promptly filled at lowest market rates.
ABRAHAM BUSSING, Secretary,
35 Chambers Street, New YorkGLOBE NAIL COMPANY,
MANUFACTURERS OF
Pointed, Polished & Finished Horse Shoe Nails

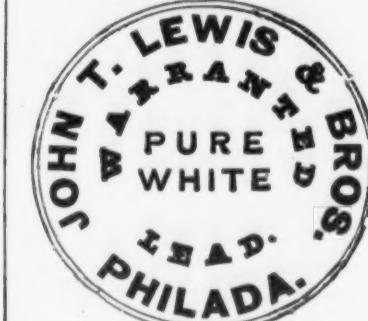
Recommended by over 20,000 Horse Shoers.

All Nails made from best NORWAY IRON, and warranted perfect and ready
for driving. Orders filled promptly and at lowest rates by

GLOBE NAIL CO. Boston, Mass.

FERNALD & SISE,
100 Chambers Street, NEW YORK,
HARDWARE MANUFACTURERS' AGENTS,Reading Hardware Co.
Cooke & Co.
Yerkes & Plumb.
Hartje, Wiley & Co.
Vulcan Horse Nail Co.
Walsh & Bro.
Morgan & Sons.Barnes & Delitz.
Nashua Lock Co.
Arcade File Works.
William McNeice.
Langstroth & Crane.
H. Rowland & Co.
A. E. Young.Underhill Edge Tool Co.
Plumb, Bardict & Barnard.
Hotchkiss, Tuttle & Co.
Klein, Logan & Co.
T. T. Rhodes.
Orleans Scythe Stone Co.

White Lead, &c.

John T. Lewis & Bros.,
No. 231 South Front St.,
PHILADELPHIA.TRADE MARK.
MANUFACTURERS OF
PURE WHITE LEAD, RED LEAD,
Litharge, Orange Mineral,
Linseed Oil
AND PAINTERS' COLOURS.The Atlantic White Lead and Lin-
seed Oil Company,
MANUFACTURERS OF
White Lead (Atlantic), Red Lead
Litharge & Linseed Oil.
ROBERT COLGATE & CO.,
287 Pearl Street, New York.Established A. D. 1777.
WETHERILL & BRO.,
Manufacturers of
White Lead, Red Lead, Litharge & Orange Mineral.
Offices, 31st St. below Chestnut, PHILADELPHIA.

Brooklyn White Lead Co. JOHN JEWETT & SONS

Manufacturers of the well known Brand of
WHITE LEAD.ADDITIONAL TRADE MARK.
We make no
objection against
the numerous spec-
imens of our
product's quality,
which are sold as
our
"WHITE LEAD,
RED LEAD,
LITHARGE,
ORANGE MINERAL,
LINSEED OIL,
AND PAINTERS' COLOURS."
F. HOWE, Tr.
Offices, No. 99 Maiden Lane,
NEW YORK.TRADE MARK.
White Lead, Red Lead and
Litharge.
89 Maiden Lane, NEW YORK.
FISHER HOWE, Trs.TRADE MARK.
Also Manufacturers of
LINSEED OIL
AND FLOOR OIL CLOTHS,
182 Front Street, NEW YORKAMERICAN TWIST DRILL CO.,
WOONSOCKET, R. I.,
And 15 New Church Street, New York,
Sole Manufacturers of the celebratedDiamond Solid Emery Wheel
MANUFACTURERS OF
PATENT EMERY WHEEL MACHINERY,
And Automatic Knife GrindersFor the rapid and perfect grinding of Planer, Paper Cutting,
Leather Splicing and other long Knives.
These goods are unsurpassed for elegance of design, work-
manship, capacity and durability. First premium awarded by
American Institute, N. Y., 1870 and '73; Medal and Diploma by
M. C. M. A., Boston, 1872.Fast Cutting—Free from Glazing—it
is the best Solid Emery Wheel.E. HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of
ENGINE LATHES,
From twelve (12) to forty-eight (48) inches swing;
Hand Lathes; Wood Turning Lathes; Vertical
Drills; Boring Mills; Tapping and Centering
Machines; Screw Press for Mandrels
Grindstone Boxes.HARRINGTON & SON,
Manufacturers of<br

Hardware.

SPEAR & JACKSON,

Sheffield, England,

MANUFACTURERS OF

Saws, Files, Edge Tools and Steel.

JOHN L. FISHER. Agent

116 Duane Street, NEW YORK.

ALFRED FIELD & CO.,

Hardware Commission Merchants,

IMPORTERS AND EXPORTERS.

Principal Offices and Warehouses:

Birmingham, Sheffield & Liverpool, England; New York & New Orleans, U. S.

A large line of Birmingham and Sheffield goods in stock at

93 Chambers St., N. Y., & 75 Gravier St., New Orleans.

HERMANN BOKER & CO.,

OFFICES AND WAREHOUSES:

NEW YORK, 101 and 103 Duane and 91 and 93 Thomas Streets.

REMSCHEID and SOLINGEN (Prussia). H. BOKER & CO.

SHEFFIELD (England), No. 3 Arundel Lane, Represented by Mr. ARTHUR LEE.

LIEGE (Belgium), Represented by Mr. LOUIS MULLER.

Manufacturers and Importers of Cutlery, Guns, Hardware and Railroad Material.

Proprietors of TRENTON VISE AND TOOL WORKS, TRENTON, N. J.—Vises, Picks,

Mattocks, Grub Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.

Proprietors of the MANHATTAN CUTLERY CO., "O. K." Razors.

Sole Agents for LAMSON & GOODNOW MFG. CO., Shelburne Falls, Mass.—Table Cutlery and Butcher Knives.

W. & S. Butcher's Files, Edge Tools and Razors, the largest stock in the United States.

Geo. Wostenholm & Son's Knives, Scissors and Razors, the largest stock in the U. S.

John Wilson's Butcher and Shoe Knives.

Peter Wright's and Armitage Anvils.

We always have on hand a full assortment of

German and English Hardware, Cutlery, Guns, Gun Material,

Chains, Heavy Goods.

ROY & COMPANY,

West Troy, N. Y.,

Manufacturers of

Wrought Iron Butts, Strap and T Hinges,

PLATE AND HOOK HINGES,

Cold Pressed Nuts and Washers, Felloe Clips, &c.

JOHN L. FISHER, Agent, 116 Duane Street, New York.

STANLEY WORKS,

MANUFACTURERS OF

Wrought Butts, Strap and T Hinges.

Bronzed Butts and Bolts.

Wrought Barrel, Square and Shutter Bolts.

Wrought Chest Handles, Washers, Flush Bolts, &c.

79 CHAMBERS ST., NEW YORK.

Factory at New Britain CONNECTICUT.

CROOKE & CO.,

MANUFACTURERS OF

WROUGHT IRON BUTTS,

All our goods are manufactured from patent faced iron plates; they have a smooth face and bright finish.

163 & 165 Mulberry Street, New York.

FERNALD & SISE, Agents, 100 Chambers Street, N. Y.

Middletown Tool Co.,

MIDDLETOWN, CONN.

Manufacturers of

The Celebrated "Baldwin" Plane Iron.

HENSHAW'S SNAPS

Greatly Improved in Style and Pattern.

HART, BLIVEN & MEAD MFG. CO., Agents

18 & 20 Cliff Street, N. Y.

ESTABLISHED A. D. 1833 and 1855.

JACOBUS & NIMICK MFG. CO.,

PROPRIETORS OF

Pittsburgh Novelty Works & Pittsburgh Variety Works.

Manufacturers of

LOCKS AND LATCHES.

Fairbanks' Standard Platform and Counter Scales, Paint and Coffee Mills Builders' and Domestic Hardware generally.

New York Office, 96 Chambers St., N. Y.

UPPMAN & EMORY, Baltimore, Md., Southern Agents.

JOHN WILSON'S CELEBRATED BUTCHERS' KNIVES, BUTCHERS' STEELS, AND SHOE KNIVES.

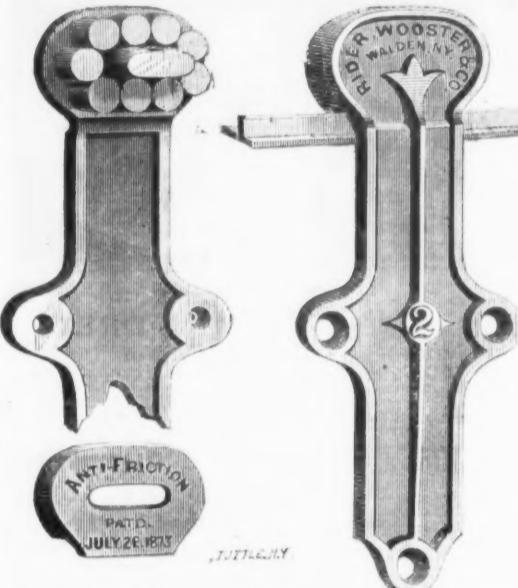


THE TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.

BUYERS ARE SPECIALLY CAUTIONED AGAINST IMITATIONS OF THE MARK, AND THE SUBSTITUTION OF COUNTERFEITS BEARING THE NAME, "WILSON," ONLY.

Works:—SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1750.

Anti-Friction Barn Door Hanger



GREAT DECREASE OF FRICTION, moving (as determined by direct experiment) with one-fifth the power required by any other Hanger in the world.

Great Strength. Unlimited Durability.

No Axles and Sheaves to grind and break.

All bearing surfaces harder than steel.

Thorough protection from the weather.

It will not clog with snow and ice.

It cannot run off the track.

It causes the door to run perfectly true.

It cannot get out of order.

It is compact, simple and beautiful in design.

This Hanger will fit any ordinary rail, but our rail is preferable, from the fact that it has a double flange at the bottom, so that the screws will not work out and allow it to rock or tip over.

No. 1 Hanger, corresponding to 4, 5 and 6 in. Sheaves or Rollers.....per pair, \$1.25

No. 2 " " 6 inch and upward.....per pair, 1.50

One Dozen Pairs in each case—dis 30 per cent.

RAIL, with Double Flange.....per foot, 7 cents.

200 feet in each case—dis 30 per cent.

200 feet in each case—dis 30 per cent.

RIDER, WOOSTER & CO., Manuf'rs, Walden, Orange Co., New York.

WHOLESALE AGENTS

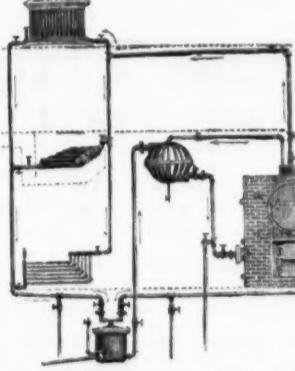
NEW YORK, Walsh, Coulter & Flagler. Russell & Erwin Mfg. Co.

BOSTON, Macomber, Bigelow & Dowse.

PHILADELPHIA, Lloyd, Supple & Walton.

CHICAGO, Hibbard, Spencer & Co.

AUTOMATIC STEAM TRAP WORKS.



C. A. PROUTY,

Inventor and Patentee.

Address,

Geo. W. Harrold,

ROCHESTER, N. Y.

We call the attention of the public to a novelty in the shape of an Automatic Steam-Trap, which returns in a continuous stream, and at a high temperature, the water of condensation, together with steam from the radiating pipes, to the boiler, below the water line. Keeping the pipes free from water prevents strain and leakage, and increases their radiating power. With this arrangement the engineer will find his labor materially lessened, since the same supply of water is converted into steam, condensed and returned to the boiler repeatedly, so that the loss of water is consequently very small, and an expensive pump is not required. This trap, which has been in operation for two years, is simple in construction and practical in application: there are no levers, weights, cranks, diaphragms or pistons to get out of order. It is self-operating, thus requiring very little attention, and will work with one radiator or twenty, only one size being needed. It is perpetual in its motion, and therein unlike other traps whose actions are spasmodic.



CENTENNIAL SELF-LUBRICATIVE Hemp Piston Packing

FOR Locomotives, Steamships, Stationary Engines,

Hot or Cold Water Pumps.

Recommended by Master Mechanics and Engineers, as the cheapest and best in market. **No more Extriorante Prices.** No more Fluted Rods—but a good article at fair price.

JOHN CANFIELD & CO.,

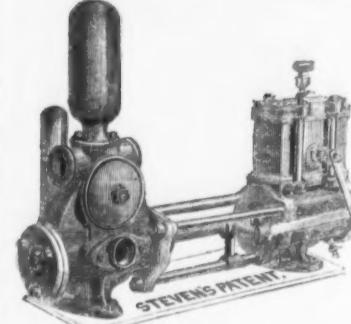
SOLE MANUFACTURERS,

Office, 1321 Fairmount Ave., Phila.

PATENT APPLIED FOR.

Send for Circular.

DIRECT-ACTING Steam Pumps,



Manufactured and for sale solely by

STEELE & CONDICT,
TITAN IRON WORKS, Jersey City, N. J.

Office and Saleroom

88 Liberty Street, New York.

No auxiliary valves used. Direct connection between piston rod and valve movement. No knocking or jarring. Circulars and price lists sent upon application.

The Best Paper! Try It!!

The **Scientific American** is the cheapest and best illustrated weekly paper published. Every number contains from 10 to 15 original engravings of new machinery, novel inventions, Bridges, Engineering works, Architecture, Improved Farm Implements, and every new discovery in Chemistry. The **Scientific American** has a circulation of 100,000, and is the most read of all industrial papers. A year's numbers contain 332 pages and several hundred engravings. Thousands of volumes are preserved for binding and reference. The practical receipts are well worth ten times the subscription price. Terms, \$3.20 a year by mail, including postage. Specimens sent free. May be had at all News-Dealers.

PATENTS obtained on the best terms. Models of new inventions and sketches examined, and advice free. All patents are published in the **Scientific American** the week they issue. Send for Pamphlet, 110 pages, containing laws and full directions for obtaining Patents.

Address for the paper or concerning Patents.

MUNN & CO., 37 Park Row, New York

Branch Office, cor. F and 7th Sts., Washington, D. C.

CLARK TOMPKINS

Manufacturer and Patentee of

UPRIGHT ROTARY Knitting Machines,

Cone Winders for Hosiery Yarns,

NAPPERS FOR HOSEIERY GOODS,

Stop Motions & Alarms for Knitting Machines,

Flock Cutters, and Flock Renovators.

EXTRA PARTS FURNISHED PROMPTLY.

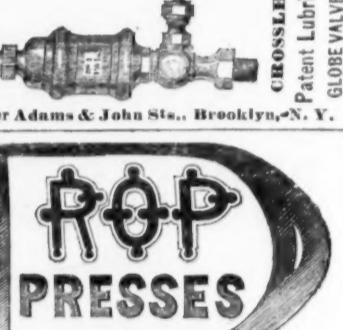
We are also prepared to furnish any thing in the line of Gear Cutting, 1 to 500 feet to 1000 feet diameter, any shape of tooth desired. Hacks, Worms, Worm Wheels, Screws any size or number of threads to the inch. Wood Planing, Iron Planing, Large Lathe Work, Gear Cutting, Shaving, Drilling, and all kinds of Metal Work, Jobbing, and Machinery in general.

Shop, Foot of Cypress St., Troy, N. Y.

Particular attention paid to Experimental Machinery.

We aim to maintain our reputation for doing work well.

Corner Adams & John Sts., Brooklyn, N. Y.



Bennett Hotchkiss and N. C. Stiles' Patent.

This Drop (which has been illustrated in this journal) is of that class in which the Hammer is raised by a stiff belt or board passing over between two friction rolls, and is so well known that we will only describe our improvement in the shape of the board or belt, and the use of the Bennett Hotchkiss (who in an interference case with Goulding and Cheney was declared the first inventor) and N. C. Stiles. Our improvement consists in the fact that the board or belt is so constructed that it will not disturb the hand lever, thereby preventing the hand being injured, as otherwise would be the case.

Second.—No dog is used on the upright to hold up the hammer, but the board or belt passes over between two clamps situated under the rolls, so arranged that as the hammer ascends they will freely open of themselves, but on descending they will close and hold up the hammer.

Third.—The board or belt is secured to the hammer by an elastic compound, which prevents the sudden jar of the blow.

Fourth.—The blow is given by the hammer, and the board or belt is so constructed that the blow is repeated until the pressure is removed, or until the hammer is raised to the height required.

Work the hand lever, which will give you any height of blow desired. The hammer can be held up at any point below the collar by raising the hand lever, and the hammer will remain suspended at that point until the blow is given.

Work the hand lever, and the hammer will descend until the blow is given.

Work the hand lever, and the hammer will descend until the blow is given.

Work the hand lever, and the hammer will descend until the blow is given.

Work the hand lever, and the hammer will descend until the blow is given.

<p



WHEELING HINGE CO.,
Wheeling, West Va.,
Manufacturers of

Wrought Butts, Strap & T Hinges, Wrought Hooks,
Hasps & Staples, Wrought Repair
Links & Washers.

GRAHAM & HAINES, Sole Agents, 88 Chambers Street, N. Y.

AMERICAN BUTT CO.,

PROVIDENCE, R. I., Manufacturers of

Cast Butt Hinges,

AND

BUILDERS' HARDWARE.

New York Warehouse with
Messrs. GRAHAM & HAINES,
No 88 Chambers Street.
Send for Price List.

All kinds of
SMALL CASTINGS
Made to order.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

Office and Salesroom,
63 OLIVER STREET,
Works Middleboro, Mass.
BOSTON.
J. CLARK WILSON & CO., New York Agents, 81 Beckman Street.

Coal Hods.

Stamped Corrugated Sheet Iron Bottom Riveted.

We manufacture six styles having our patent corrugated bottom, and all having the body bottom and hoop riveted together. Dealers before buying will find it to their advantage to get our prices, and also to beware of a scammed hod that is in the market, something similar in shape to ours. Don't buy any but the Corrugated Riveted Bottom Hod, manufactured by

SMITH, BURNS & CO., 46 Cliff St., N. Y.

Also Manufacturers of

Galvanized and Japanned Sheet Iron Goods, and Plain, Stamped and Japanned
TIN WARE.

FRY PANS, FIRE SHOVELS, ASH SIFTERS, &c.

Send for Catalogue.

From 1841
GREENFIELD TOOL CO.
Sole Manufacturers of the Celebrated
"Diamond" PLANE IRONS.

To 1875.

OF Uniform temper and Warranted.
PATENT FORGED ON SHOES. The only Shoe made with concavity to fit hoof. BENCH AND MOULDING PLANES of every description. Also, Plow and Match Bits, Moulding and Rabbet Irons, Plane Tops, Cuts, Starts, Plates, &c., &c. Drop Forgings to order. Address for Catalogue with stamp.
GREENFIELD TOOL CO., Greenfield, Mass.

COBB & DREW,

Plymouth, Mass.

Manufacturers of Copper, Brass, and Iron Rivets. Common and Swedish Iron, Leathered, Carpet, Lace and Glass Tacks; Finishing, Hungarian, Trunk, Clove and Cigar Box Nails, &c. Rivets made to order.

NEW YORK AGENCY

Grundy & Kenworthy HARDWARE.

165 Greenwich Street.

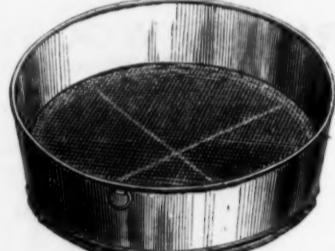
Agent for the Philadelphia Star Carriage and Tire Belts.

SAMUEL LORING'S PLYMOUTH TACK AND RIVET WORKS
PLYMOUTH, MASS., manufacturer of
TACKS, BRADS, NAILS AND RIVETS.

Swedes and Common Iron Tacks; Leathered, Carpet, Brush, Lace and Glass Tacks; Finishing, Hungarian, 2d and 3d Blue, Trunk, Clove, and Cigar Box Nails; Black and Tinned Nails; Zinc, Iron, Copper and Steel Sheet Nails; Brads and Patent Brads; Glaziers' Points & Points for Glaziers' Tools; **PERF. BRADS**; **PERF. RIVETS**, of all kinds. Copper Rivets, from 1d to 6d, in cases of 100 lbs. each. Hose, Bell and Shoe Rivets and Bars. Oval and Counterpane Heads of extra lengths, made to order. SHIP AND BOILER RIVETS OF ALL SIZES AND LENGTHS.

R. J. MANN & CO.

Sole Manufacturers of



Mann's Patent Metallic Sieve,
24 South Commercial St., St. Louis, Mo.

The best sieve in use. To be had of all dealers.

A full assortment of these goods kept in stock at

88 Chambers Street, N. Y.

GRAHAM & HAINES, Sole Agents

at 88 Chambers Street, N. Y.

Send for Price List.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GEORGE T. RICHARDSON.

FRANK H. SCUDER.

Middleboro' Shovel Co.,

MANUFACTURERS OF

SHOVELS, SCOOPS & SPADES.

GE

PHILADELPHIA.

(Corrected weekly by *Lloyd, Supples & Walton*).
Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Avails.—Solid Cast Steel.	per lb. \$ 14c
Peter Wright's.	per lb. gold, 12c
Wilkinson's.	11 1/2c
Eagle.	11 cents currency—als 15 @ 1 1/2c %
Apple Parers.—Union.	per dozen \$ 60 net
Skeleton.	6 1/2c
Victor.	6 1/2c net
Domestic.	7 1/2c net
Reading.	7 1/2c net
Bay State Farin, Coring and Slicing.	12 1/2c net
" " Peach Parers.	10 1/2c net
Axes.—Mann's Light.	per dozen \$ 12 50 @ 12 1/2c
Hunt's Light.	13 00 @ 12 1/2c
Red Indian, all sizes.	12 50 @ 12 1/2c
Red Chilian, all sizes.	13 00 @ 12 1/2c
Prince.	13 00 @ 12 1/2c

Angers and Auger Bits.—Ricer's Pat.

Twist Bits.	25 @ 30 5
Douglas' & Ives' Bits.	30 @ 30 5
Connecticut Valley Auger Bits.	30 @ 30 5
Cook's Bits.	30 @ 30 5
Jennings' Bits.	30 @ 30 5
Bates' Nut Augers.	30 @ 30 5
Douglas' & Ives' Augers.	30 @ 30 5
Watrous' Ship Augers.	30 @ 30 5
Bonney's Pat. Hollow Augers.	25 @ 25 5
Stearns' Patent Hollow Augers.	25 @ 25 5
Balances.—Landers, Frary & Clark's.	40 @ 40 5
Chatillon's.	40 @ 40 5
Morton's.	40 @ 40 5
Common Spring with Hook.	40 @ 40 5
Bells.—Invin Bros. Mfg. Co. Light Hand Bells.	40 @ 40 5
Other makers' Light.	45 @ 45 5
Swiss Pattern Hand Bells.	50 @ 50 5
Connell's Door Bells.	50 @ 50 5
Great Western and Kentucky Cow.	50 @ 50 5

Boring Machines.—Bates' Mfg. Co., complete with augers.

Douglas' Mfg. Co., complete with augers.	15 @ 20 5
Common Boring Machines, no Augers.	31 25 @ 4 00
Augers.	5 25 @ 5 00
Bolts.—Eastern Carriage Bolts.	special prices
Western.	10 1/2c
Philadelphia	10 1/2c
" Eagle, (Coleman's).	10 1/2c
Bracing.	10 1/2c
Bracing.—Barber's.	10 1/2c
Bracing.—Barber's.	10 1/2c
Bartholomew's American Ball.	10 1/2c
Sparton.	10 1/2c
Bolts.—Cast Fast Joint, Narrow.	10 1/2c
" Broad.	10 1/2c
Cast Fast Loose Joint.	10 1/2c
" Acorn, Loose Pin.	10 1/2c
Wrought Loose Pin.	10 1/2c
" Clamps and Back Flaps.	10 1/2c
" Narrow.	10 1/2c
" Loose Joint.	10 1/2c
" Horizontal.	10 1/2c
Hinges.—Malleable.	10 1/2c
Elbows—Corrugated.	5 5 1/2c
Charcoal.	35 30
Wrought Narrow.	10 1/2c
Broad, Loose Joint.	10 1/2c
" Clamps and Flaps.	10 1/2c
Wrought Hinges, Loose Pin.	10 1/2c
Leather, new list, oak tanned.	10 1/2c
Bracing.—Barber's.	10 1/2c
Bracing.—Rutherford's.	10 1/2c
Bracing.—Brooks' Patent.	10 1/2c
Butts—Brass Butts.	10 1/2c
Augers.—Snel Mfg. Co.	10 1/2c
Shepard's.	10 1/2c
" Discount 50 & 10 % by the case.	10 1/2c
Clark's.	10 1/2c
" Discount 50 & 10 %.	10 1/2c
Chisel's.	10 1/2c
Chisel's.—Socket Framing.	10 1/2c
Socket Firmer.	10 1/2c
Tang.	10 1/2c
Brace & Fitting's.	10 1/2c
Clamps.	10 1/2c
Casters.—Porcelain Wheel.	10 1/2c
Iron and Brass Wheels.	10 1/2c
Iron Bed.	10 1/2c
Chisel's.	10 1/2c
Chisel's.—Universal.	10 1/2c
Novelties.	10 1/2c
Discount on 2 dozen lots, \$2 per dozen.	10 1/2c
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15 5
Landers, Frary & Clark, J. Russell & Co. and Lauzon & Goodnow Mfg. Co., Manufacturers net prices.	15 @ 15 5
Drawing and Tracing.	15 @ 15 5
Comps.—Adjustable Handle.	15 @ 15 5
Beatty.	15 @ 15 5
Fry Pans.	15 @ 15 5
Tinned.	15 @ 15 5
Novelties.	15 @ 15 5
Discount on 2 dozen lots, \$2 per dozen.	15 @ 15 5
Coffee Mills.—Common Box and Side.	15 @ 15 5
Pans.—Common Box and Side.	15 @ 15 5
Cutters.—American, Port, Quill, and Cut.	15 @ 15

Steel.

THREE
CLASS PRIZE MEDALS.
CLASSES 1, 21, 22,
Exhibition of Industry
LONDON, 1851.

MEDAL OF HONOUR,
SOCIETY OF ARTS & INDUSTRY,
LONDON, 1856.

1st CLASS
PRIZE MEDAL, CLASS 18
UNIVERSAL
EXHIBITION OF INDUSTRY
PARIS, 1855.

COCKER BROTHERS
SUCCESSORS TO
SAML COCKER & SON,
(Established 1752.)
SHEFFIELD, ENGLAND

MANUFACTURERS OF
CAST, COLD, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.
CAST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.
BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO

GENERAL MERCHANTS.
Agent, JONATHAN HATTERSLEY, Cincinnati, O.

WM. JESSOP & SONS,
MANUFACTURERS OF
STEEL,
AND IMPORTERS OF IRON
SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:
NEW YORK, Nos. 91 & 93 John Street..... BOSTON, No. 141 Federal.
ST. LOUIS, No. 714 North Second Street..... AGENCIES
PHILADELPHIA, Jas. C. Hand & Co..... PROVIDENCE, Nightingale & Kilton.
CHICAGO, Crerar, Adams & Co..... NEW ORLEANS, Folger & Co.
CINCINNATI, Augustus Wessel..... SAN FRANCISCO, Huntington, Hopkins & Co.

F. W. MOSS,
Successor to JOSHUA MOSS & GAMBLE BROS.
WALKLEY WORKS,
SHEFFIELD, ENGLAND.
MANUFACTURER AND IMPORTER OF
STEEL AND FILES.
Principal Depots: 80 John St., N. Y., and 512 Commerce St., Phila.
MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,
Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.
WARRANTED CAST STEEL, especially adapted for DIES and TURNING TOOLS, DRILLS, COLD CHISELS,
(Celebrated Improved Mild Carbon Cast Steel), Taps, Reamers, and Milling Tools,
warranted not to crack in hardening. Tape of any size.
Swede Spring Steel, especially adapted to Locomotive and Railway Car Springs.
English Spring and Plow Plate Steel. Also, manufacturer of
Steel Cast Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel
And GENERAL MERCHANT.
A. M. F. WATSON, General Agent.

WILSON HAWKSWORTH, ELLISON & CO.,
MANUFACTURERS OF
STEEL, STEEL WIRE, &c.,
AND GENERAL MERCHANTS.
CARLISLE WORKS, SHEFFIELD, ENGLAND.
AGENCIES
New York, 72 John Street.
Philadelphia, 505 Commerce Street.
Boston, 21 Oliver Street.
New Orleans, La., 111 Gravier St.

BARROW HÆMATITE STEEL COMPANY,
LIMITED.

BARROW IN FURNESS,
LANCASHIRE, ENGLAND.
MANUFACTURERS OF
Steel Rails, Tyres, Wheels,
Axles, Shafting, Boiler & Ship Plates, Bessemer Pig Iron, etc., etc.
CHAS. CONGREVE & SON,
Sole Agents for the United States,
104 & 106 John Street, opposite Cliff Street, NEW YORK.

J. & RILEY CARR,
MANUFACTURERS OF SUPERIOR
STEEL
For Tools, Cutlery, Saws, Files, Augers, Gimblets, &c.; Sheet Cast Steel for
SPRINGS AND STAMPING COLD;
ALSO THE CELEBRATED
DOG BRAND FILES.
Unsurpassed, if equaled in quality.
Bailey Lane Works, Sheffield, England.
Warehouse, 82 John St., New York.
Established 1810.



HENRY MOORE, Attorney.

Steel.

SANDERSON BROTHERS & COMPANY,
(LIMITED)

DARNALL WORKS, ATTERCLIFFE FORGE, SHEFFIELD, ENGLAND.

Sole Manufacturers of the CELEBRATED

CAST STEEL,

Warranted most SUPERIOR and UNSURPASSED for
TOOLS and GRANITE ROCK DRILLS.

A full assortment of this universally approved OLD BRAND of
English Steel, and

ARMITAGE'S GENUINE MOUSEHOLE ANVILS,

For Sale by

EDWARD FRITH, 16 Cliff Street, New York.

FRANCIS HOBSON & SON,
97 John Street, NEW YORK.

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

JOHN HOGAN, Agent.

S. & C. WARDLOW,

MANUFACTURERS OF THE CELEBRATED

**Cast and Double Shear
STEEL,**

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table, Carving, Butcher and Shoe Knives, Turning Tools, Dies, Files, Clock or other Springs, Saws and Tools of every variety.

SHEFFIELD, ENGLAND.

Office of S. & C. WARDLOW, 95 John Street, New York.

In calling the attention of consumers of Steel in
any of the various above departments, we would respectfully advise
them of our ability to supply an article, that cannot be equalled in
quality, temper, and adaptability in all respects to the various purposes
for which it may be required. Supply a variety of practical offer-
ings in all departments of Steel manufacture, a long established
reputation in England, and the Cabinet of Europe, and in the Custom
States principally of this Country, encourage us to solicit a general
trial of our Steel for the above or other purposes for which a first
class material in quality, temper, and durability is needed.

G. SANDERSON & CO.,

Manufacturers of all descriptions of

STEEL.

Bailey Street and
Broad Lane Steel Works, SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for

Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &c.

ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &c.

Hot and Cold Rolled Sheets for Clock Springs, Corset Clasps, Pens, &c.

Makers of the Celebrated ROCK BORING DRILL STEEL.

Warehouse, 57 John Street, New York.

JOHN A. CRISWOLD & CO.,

TROY, N. Y.,

Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

Bessemer Railway Steel,

MERCHANT BARS, TIRE AND SHAFTING,

Railroad Iron, Pig Iron, Merchant and Ship Iron,
AGENCIES IN BOSTON AND PHILADELPHIA.

D. G. GAUTIER & CO.,

MANUFACTURERS OF

Hammered and Rolled STEEL of every description

JERSEY CITY, NEW JERSEY.

DUDLEY G. GAUTIER.

JOSIAH H. GAUTIER.

CHROME STEEL COMPANY,

MANUFACTURERS OF

CHROME CAST STEEL,

WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—
FOR EVERY PURPOSE.

Principal Office & Works, Kent Ave. and Keep St., Brooklyn, E. D., N. Y.
AGENCIES.

Kimball Bros. & Co., Chicago, Illa.
Huntington, Hopkins & Co., San Francisco and
Sacramento, Cal.
M. M. Buck & Co., St. Louis, Mo.

Potter & Hoffmann, Philadelphia, Pa.
Geo. Durbar & Co., Boston, Mass.
Wood, & Legatt, Hamilton, Ont.

WILLIAM TOOKE, Genl. Sales Agent, 110 Liberty St., N. Y. City.

Steel.

Sheffield Steel Works,
(Established in 1848.)

SINGER, NIMICK & CO.

Pittsburgh, Pa.,
Manufacturers of Extra Quality Tool

CAST STEEL,
Patent Rolled

SAW PLATES,

All descriptions of Cast and German

Spring and Plow Steel

Elliptic and Side Springs, Sent Springs,

AXLES, STEEL TIRE,

Plow Wings, Shares, Cultivators,

Reaper Bars, Cow Bars, &c., &c.

Warehouse, 83 Water and 100 First Streets.

ISAAC JENKS & SONS,
Minerva & Beaver Iron & Steel Works

Wolverhampton, England,

Manufacturers of
"Jenks" Spring Steel, Cast and
Swedes Spring Steel,

TIRE, TOE CORK, SLEIGH SHOE,

BLISTER & PLOW STEEL.

Also, Plow and other Iron.

VAN WART & McCOY, Agents,
43 Chambers St., New York.
A full assortment of "Jenks" Spring Steel in stock.

MILLER, BARR & PARKIN,
Crescent Steel Works,

PITTSBURGH, PA.

Manufacturers of all descriptions of

STEEL

EQUAL TO ANY IN THE MARKET.

Office..... 339 Liberty St.,
PITTSBURGH, PA.

Gunpowder.**GUNPOWDER**

DUPONT'S
Sporting, Shipping, and Mining
POWDER.

DUPONT'S GUNPOWDER MILLS

ESTABLISHED IN 1801,

Have maintained their great reputation
years. Manufacture the

Celebrated Eagle Ducking, Eagle Rifle,
and Diamond Grain Powder.

Also, SPORTING, MINING, SHIPPING, AND BLAST-
ING POWDER.

of all kinds and descriptions.

For sale in all parts of the country. Represented
by

F. L. KNEELAND
70 Wall Street, NEW YORK.

CUNPOWDER

LAFLIN & RAND POWDER CO.

21 Park Row, New York,

invite the attention of the the Hardware Trade to

their facilities for delivering

**BLASTING, MINING and RIFLE
POWDER**

IN EVERY PART OF THE UNITED STATES
from having agencies and magazines at all prominent
points, beside our works at

Newburg, Saugerties, Kingston, and

Catskill, N. Y.; Scranton, Carbon-

dale and Pittsville, Pa.; Balti-

more, Md., and Platteville, Wis.

The superiority is well known of our brands

Safe Powder

Orange Rifle, Orange Ducking

Lightning, Audubon.

SAFETY-FUSE at wholesale,

Steel.

HUSSEY, WELLS & CO.

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL,

INCLUDING

Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

Railroad Supplies, Homogeneous Plates

FOR LOCOMOTIVES, BOILERS AND FIRE BOXES,

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &c.

ALSO, MANUFACTURERS OF THE CELEBRATED BRAND

"Hussey, Wells & Co. Cast Spring Steel,"

For Elliptic Springs for Railroad Cars & Locomotives.

PENN AND SEVENTEENTH STS., PITTSBURGH, PA.

BRANCH OFFICES:

30 Gold St., New York. 13 & 15 Custom House St., Boston. 146 E. Lake St., Chicago.

Pittsburgh Steel Works.

ESTABLISHED IN 1845.

ANDERSON & WOODS,

MANUFACTURERS OF

BEST REFINED CAST STEEL,

Cast and German Plow and Spring Steel,

FIRST AVE., AND ROSS ST., PITTSBURGH.

BRANCH HOUSES

No. 71 and 75 North Street, Boston.

A. B. PARKER, 12 CHI Street, New York.

W. F. POTTS, SON & CO., 123 Market Street, Philadelphia.

FARIST & WINDSOR,

BRIDGEPORT, CT.
1872.

WINDSOR LOCKS, CT.

ALL DESCRIPTIONS OF

CAST STEEL

made to order for Cutlery, Dies, Agricultural Implements, Decarbonized Steel, Frog Plates and Points, Steel Forgings to Pattern. Quality equal to the best.

JOEL FARIST.

Prices as low as the market admits.

JOHN B. WINDSOR.

LABELLE STEEL WORKS.

SMITH, SUTTON & CO.,

MANUFACTURERS OF ALL KINDS OF

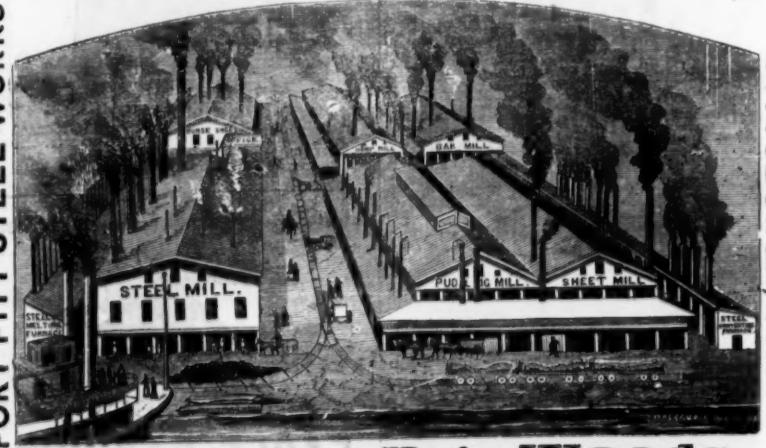
STEEL.

Also, Springs, Axles Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.

Post Office Address, Pittsburgh, Pa.

FORT PITT STEEL WORKS



Reese, Graft & Woods.

MANUFACTURERS OF

Wrought Iron Carriage & Wagon Hardware

AND ALL DESCRIPTIONS OF

Steel & Iron Drop Forgings

OFFICE AND WORKS:

1203, 1205 & 1207 East Thompson St. above Cumberland PHILADELPHIA.

Chain.

Chicago Chain Works,

S. G. TAYLOR, Prop.

Nos. 98 & 100 Indiana St., Chicago, Ill.

Dredge and Crane Chain, a specialty.

American Chain Cable Works.

Thirty years' experience in the business.



KENDRICK & RUNKLE, Trenton, N. J. Manufacturers of Cable, Crane, Car Brake, Agricultural Machine and Harness Chains of every description. Also, sole manufacturers of KENDRICK'S PATENT IMPROVED TRIPLE COAL MINE SLOPE CHAIN.

N. B. The highest grades of Crane Chains a specialty.

New England Chain Works

771 Eddy Street, Providence, R. I. Manufacture Iron Chain of every description.

Mowing Machine, Crane, Break

Draft Chains, &c., &c.

Also, Latest Improved Cotton Can Rings.

THOS. WYATT, Proprietor.

BUFFALO

Bellows Factory and

Planing Mill.

ESTABLISHED 1852.

JOSEPH CHURCHYARD,

Contractor, Builder

AND

Manufacturer,

CLINTON, cor. ADAMS STS.,

Buffalo, N. Y.

SASH, BLINDS, DOORS,

Cisterns, Tanks, Stairs, Hand Railings, Novelty, Mirror Frames, Mantels, Curtain Cornices, Book Cases, Veneered Doors, Moldings, and complete interior and exterior finish for houses.

ROUGH AND PLANED LUMBER,

Flooring, Siding, Shingles, Lath and Fence Posts.

Blacksmiths' & Moulders' Bellows.

CHICAGO.

(Reported by Frank Sturges & Co., 72, 74 & 76 Lake St.)

Tin Plates.

10x14, 1C, Ch. Good, \$1.00

Best, " 12.00

12x14, 1C, " 14.50

DC, 100 Plate, " 12.00

12x12, 1C, " 12.50

D. X. " 14.00

12x12, 1C, " 15.00

D. X. " 16.50

12x12, 1C, " 17.00

D. X. " 18.50

12x12, 1C, " 19.00

D. X. " 20.50

12x12, 1C, " 21.00

D. X. " 22.50

12x12, 1C, " 23.00

D. X. " 24.50

12x12, 1C, " 25.00

D. X. " 26.50

12x12, 1C, " 27.00

D. X. " 28.50

12x12, 1C, " 29.00

D. X. " 30.50

12x12, 1C, " 31.00

D. X. " 32.50

12x12, 1C, " 33.00

D. X. " 34.50

12x12, 1C, " 35.00

D. X. " 37.00

12x12, 1C, " 38.00

D. X. " 40.00

12x12, 1C, " 39.00

D. X. " 42.00

12x12, 1C, " 40.00

D. X. " 43.00

12x12, 1C, " 41.00

D. X. " 44.00

12x12, 1C, " 42.00

D. X. " 45.00

12x12, 1C, " 43.00

D. X. " 46.00

12x12, 1C, " 44.00

D. X. " 47.00

12x12, 1C, " 45.00

D. X. " 48.00

12x12, 1C, " 46.00

D. X. " 49.00

12x12, 1C, " 47.00

D. X. " 50.00

12x12, 1C, " 48.00

D. X. " 51.00

12x12, 1C, " 49.00

D. X. " 52.00

12x12, 1C, " 50.00

D. X. " 53.00

12x12, 1C, " 51.00

D. X. " 54.00

12x12, 1C, " 52.00

D. X. " 55.00

12x12, 1C, " 53.00

D. X. " 56.00

12x12, 1C, " 54.00

D. X. " 57.00

12x12, 1C, " 55.00

D. X. " 58.00

12x12, 1C, " 56.00

D. X. " 59.00

12x12, 1C, " 57.00

D. X. " 60.00

12x12, 1C, " 58.00

D. X. " 61.00

12x12, 1C, " 59.00

D. X. " 62.00

12x12, 1C, " 60.00

D. X. " 63.00

12x12, 1C, " 61.00

D. X. " 64.00

12x12, 1C, " 62.00

D. X. " 65.00

12x12, 1C, " 63.00

D. X. " 66.00

12x12, 1C, " 64.00

D. X. " 67.00

12x12, 1C, " 65.00

D. X. " 68.00

12x12, 1C, " 66.00

D. X. " 69.00

12x12, 1C, " 67.00

D. X. " 70.00

12x12, 1C, " 68.00

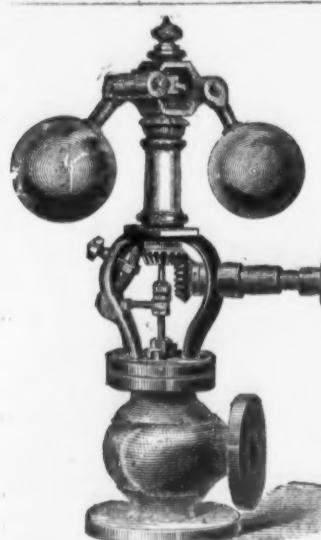
D. X. " 71.00

12x12, 1C, " 69.00

D. X. " 72.00

12x12, 1C, " 70.00

D. X.



TO ALL WHO USE STEAM-
POWER!

We will put our Governor on any engine, and guarantee it to prove itself superior to all others.

If, after a fair trial, it does not, we will take it off at our own expense.

Shive Governor Co.
BETHLEHEM, PA.

ALSO,
SHIVE'S PATENT WATCHMAN'S
CLOCK AND DETECTOR.

The Best and Cheapest Watcher of the Watchman made

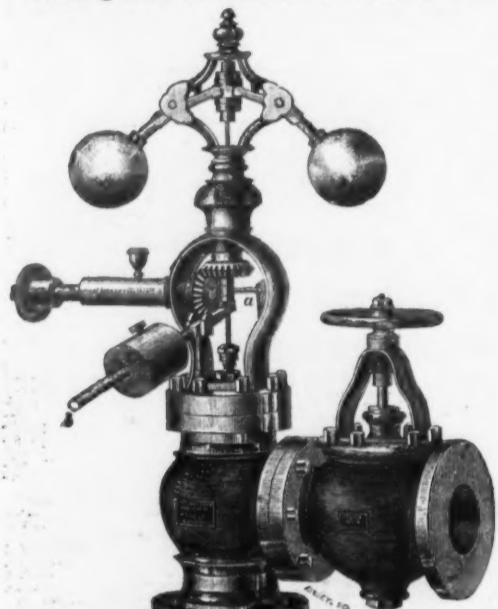
PRICE ONLY \$15.

Circulars sent free.

February 10, 1875. REDUCED PRICE LIST OF THE
JUDSON PATENT IMPROVED GOVERNORS.

EW W. Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Black, Finished or Portable, as you may require, with or without Lever Attachment.

For dimensions and other particulars send for Illustrated List.



Capacity of Valve or Diameter of Steam Pipe in inches.	Price, Black.	Price, Bright.	Finish.	Price, Portable.	Price of Lever Attach- ment for Altering speed.	Price of Stop Valve.
18	18.00	20.00	17.00	—	—	—
20	20.00	22.00	19.00	—	—	—
24	27.00	29.00	22.00	2.00	5.25	—
30	32.00	32.00	27.00	2.25	6.65	—
34	38.00	38.00	31.00	2.50	8.50	—
41	46.00	46.00	35.00	2.75	11.50	—
47	54.00	—	—	3.25	16.00	—
50	57.00	57.00	47.00	3.50	17.00	—
55	62.00	62.00	57.00	3.75	19.00	—
62	69.00	69.00	66.00	4.00	22.00	—
71	80.00	80.00	74.00	4.25	27.00	—
81	92.00	92.00	85.00	5.00	32.00	—
91	103.00	103.00	95.00	5.50	37.00	—
102	114.00	114.00	105.00	6.00	42.00	—
116	129.00	129.00	118.00	6.50	48.00	—
134	144.00	144.00	134.00	7.00	55.00	—
169	176.00	176.00	169.00	8.00	69.00	—
199	219.00	219.00	199.00	9.00	83.00	—
280	255.00	—	—	10.00	—	—

No Charge for Boxing & Cartage.

It is a common method to advertise Governors *without cost*, unless satisfactory to the customer, and then charge *High Prices* for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their Governor will be tested, and also take care that they do not buy an inferior Governor for a higher price than those shown in the above list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

JUNIUS JUDSON & SON, Rochester, N. Y.

The Pratt & Whitney Co.,

Hartford, Conn.

Have constantly on hand and making



Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Malle to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

**BLAKE'S PATENT
STONE & ORE BREAKER.**

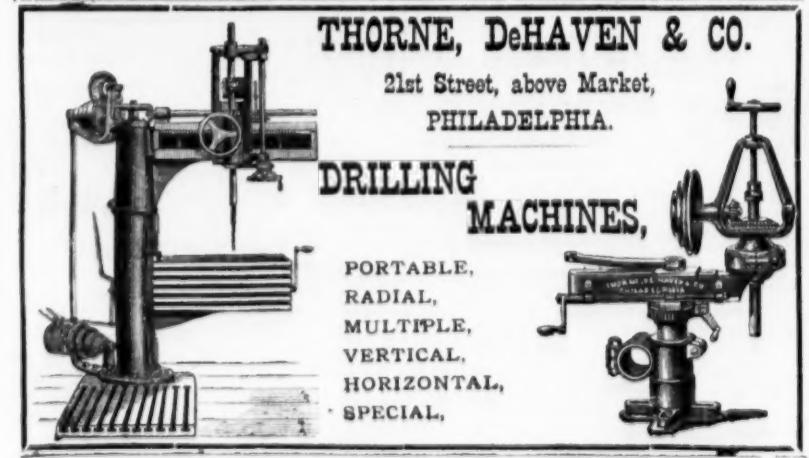
New Pattern with Important Improvements & Abundant Strength

For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect MACADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for: making QUARZ, FLINT, EMERY, CORUNDUM, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Plaster, Soapstone, &c. For Illustrated Circulars, and particulars, address,

BLAKE CRUSHER CO., New Haven, Conn.



CORLISS STEAM ENGINE.

The Best in the World for Economy in Fuel and Cost of Running.

BUILT BY

Robert Wetherill & Co.,

Chester, Pa.,

Engineers, Machinists, Founders,

And BOILER MAKERS.

Stationary Engines, Shaving, Mill Gearing, Boiling Machines, Improved Piston

Packing and Machinery.

Special attention given to Boring Ports and Cylinders.

THORNE, DeHAVEN & CO.

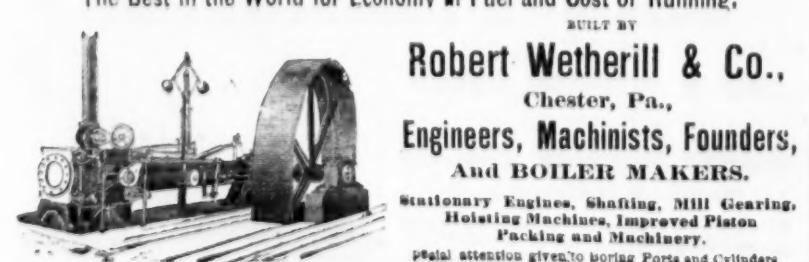
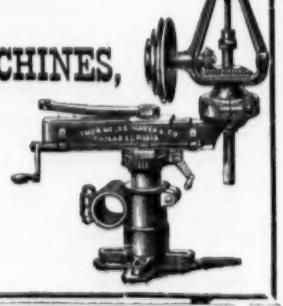
21st Street, above Market,

PHILADELPHIA.

DRILLING

MACHINES,

PORtable,
RADIAL,
MULTIPLE,
VERTICAL,
HORIZONTAL,
SPECIAL,



CORLISS STEAM ENGINE.

The Best in the World for Economy in Fuel and Cost of Running.

BUILT BY

Robert Wetherill & Co.,

Chester, Pa.,

Engineers, Machinists, Founders,

And BOILER MAKERS.

Stationary Engines, Shaving, Mill Gearing, Boiling Machines, Improved Piston

Packing and Machinery.

Special attention given to Boring Ports and Cylinders.

A Written Guarantee given with our Pumps.

ENTERPRISE HYDRAULIC WORKS,

Fan Blowers.

2218 & 2220 Race Street, Philadelphia.

Piston

Blowers,

"FOULDS"

Patent Water

Elevator.

STEAM PUMPS for all duties required.

Centrifugal, Hand and Power Pumps, Special Double Plunger Pumps for Mining Purposes. Boiler Feed and Tank Pumps.

Woodruff Iron Works,

Office, 223 State Street, Hartford, Conn.

Manufacturers of the Celebrated



Woodruff & Beach Steam Engine,

With recent valuable improvements.

Steam Boilers

Constantly on hand and made to order any size or style. Special attention given to the manufacture of

MILL WORK

And all kinds of Machinery.

CASTINGS

Of any size or style. Direct all letters to The Woodruff Iron Works, Hartford, Conn., as the Woodruff & Beach Iron Works and firm of Woodruff & Beach are both dissolved.

Knowles Patent Steam Pumps

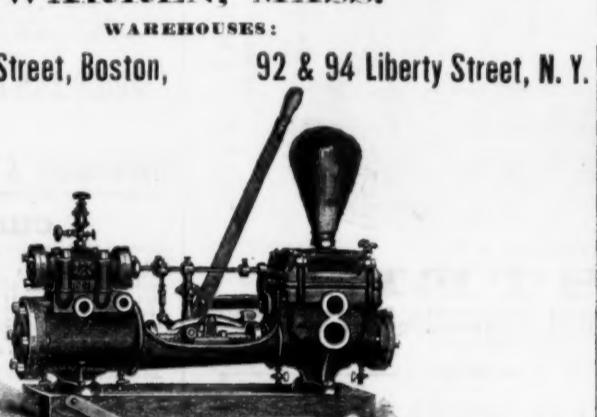
MANUFACTURED BY THE

KNOWLES STEAM PUMP WORKS,
WARREN, MASS.

WAREHOUSES:

14 & 16 Federal Street, Boston,

92 & 94 Liberty Street, N. Y.

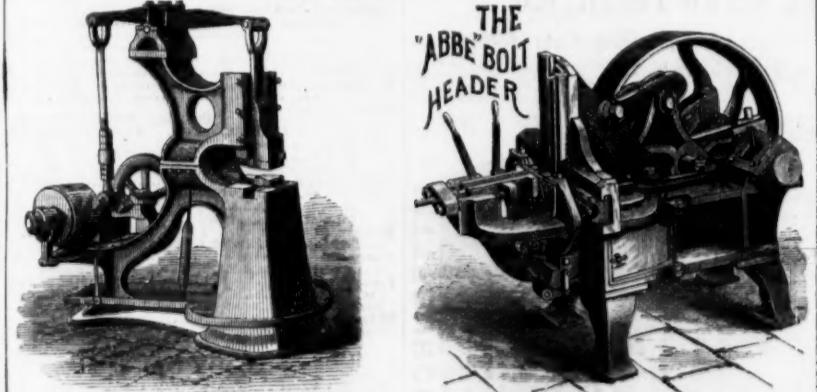


Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

FIRE PUMPS, a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern,) which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best.

Every machine furnished under a complete guarantee.



THE PALMER POWER SPRING HAMMER.

Of these Machines we are building sizes to meet the requirements of all Manufacturers and Workers of Iron and Steel. In simplicity, durability, ease of operation, accuracy, and range of work, we guarantee them superior to any Machines of their kind produced in the world. For prices, references, and full descriptive circulars, address

S. C. FORSAITH & CO.,

Manchester, N. H.

The Albany Steam Trap.

This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

TOWNSEND & BLESSING,
Albany, N. Y.

Of various sizes for ENGINES and PUMPS, manufactured by JAMES GLANDING & CO., No. 115 Queen St., Philadelphia. What the proprietors claim for the Eagle Packing: 1. Its general adaptation to all purposes for which packing is used. 2. Its durability. It will outlast any other article in use. 3. Its cheapness. It can be furnished to the consumer at a lower rate than any other packing

JAMES HENSHALL,
Engineer, Machinist & Blacksmith,

165 Beach St. PHILADELPHIA.

Drawings made to order. Repairing of all kinds promptly attended to. Blacksmithing executed in all its branches.

EAGLE PACKING,

Philadelphia, Pa.

Machinery, &c.

THE

Shapley Engine

Patented Feb. 10, 1874.

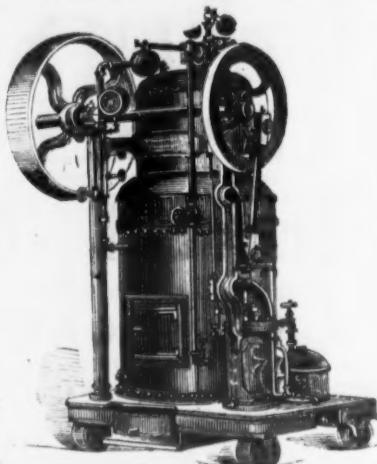
COMPACT,
PRACTICAL,
DURABLE,
ECONOMICAL.
\$200.00.Cheaper than any Engine offered of
the same capacity.

MANUFACTURED BY

SHAPLEY & WELLS.

Binghamton Iron Works,

Binghamton, N. Y.

Manufacturers of Steam Engines, Boilers, Water Wheels, Circular Saw Mills and
Mill Work generally.

FAIRMOUNT MACHINE WORKS,

Office, 2106 WOOD St., Philadelphia.

Manufacturers as Specialists

POWER LOOMS,

SPOOLING, BEAMING, DYEING and
Sizing Machines.

PATENT BOBBIN WINDING MACHINES

wind direct from
hank or skein to shuttle bobbin.

SHAFTING

With Patent Adjustable self-oiling Bearings.

Adjustable Self-Oiling Hangers,

8, 10, 12, 15 and 18 in. drop.

Ball and Socket Self-Oiling Pillow Blocks.

Pulleys, from 4 inch to 10 feet in diameter.

Pulleys made in two parts,

any size required.

SELF-ACTING WOOL-SCOURING MACHINES,

LARD AND PARAFFINE OIL PRESSES.

Improved

Power Hoisting Machines.

Machine and Foundry Work in all

their branches.

Plans taken, and Factories fitted out com-

plete with shafting and Gearing

Send for list of Pulleys, &c.

THOMAS WOOD.

Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.,

VALVES

(Double and Single Gate, $\frac{1}{4}$ in. to 48 in.—outside and inside Screws, Indicator, &c., for Gas, Water and Steam. Send for Circular.)

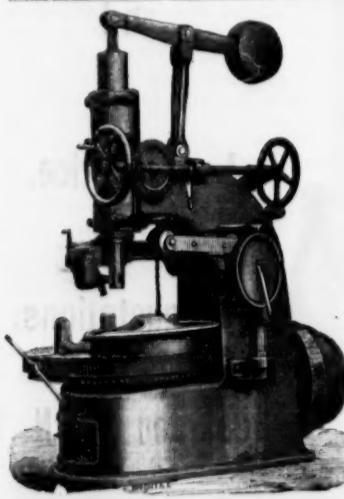
Also FIRE HYDRANTS.

PORTABLE PIPE AND BOLT
Threader and CutterCuts off and threads from $\frac{1}{4}$ inch to 3 inch Pipes and Bars. Also taps Nuts and Centers work ready for Lathes. One man can thread 3 inch Pipe with ease with Dies furnished with machine. No Pipe splitting; no bevel inside or out. Requires no skilled labor.A Full Set of Sockets and Lengths for Making Nipples
Furnished with each Machine.

ANY SOLID DIE CAN BE USED IN THIS MACHINE.

Send for Circular.

EMPIRE MFG. CO., 62 Gold Street, N. Y.

We have the best and most complete assortment of
MACHINISTS' TOOLS,
in the country, comprising all those used in Machine, Loco-
motive and

R. R. REPAIR SHOPS.

We make a specialty of manufacturing

Gear Wheels of all Descriptions,
which are made absolutely perfect, with Patent Gear
Molding Machine.For Photographs, Prices and Description, &c., address
N. Y. STEAM ENGINE CO.,
98 Chambers Street, New York.

STURTEVANT

Pressure Blowers, Fan Blowers
and Exhaust Fans.

10,000 SOLD IN SIX YEARS.

SEND FOR ILLUSTRATED CATALOGUE.

B. F. STURTEVANT, 72 Sudbury Street,

BOSTON, MASS.

Machinery, &c.

COMBINATION.

Having purchased all of the Right, Title and Interest of the firm of DIBBLE & HINE, of New Haven Ct., in the

Hine Patent Bolt Cutter and Nut Tapping Machines,

and having combined the "Hine Patent and Chapin Improved Bolt Cutter," we now offer to the public the improved

HINE PATENT BOLT CUTTER, the best machine in the market.

Its superiority over all other machines is the ease and rapidity with which the Dies can be changed, and the quality and quantity it can produce. Any boy can, in one minute, change the Dies from one size to another. We build machines to cut from one-quarter inch to and including two inches. Hence we can furnish the Bolt Shop, Railroad Shop, Machine Shop, or any shop with the **cheapest and best** Bolt Cutter in the market.

Prices and any information given on receipt of letter, by addressing

THE CHAPIN MACHINE COMPANY,
Pine Meadow, Conn.
TIRE BLANK AND RIVET MACHINES, BOLT HEADERS, &c.,
constantly on hand and made to order.

Established 1848.

WM. SELLERS & CO.,

1600 Hamilton Street, PHILADELPHIA.

Engineers, Iron Founders and Machinists.

RAILWAY SHOP EQUIPMENTS.

Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters
are of Improved and Patented Construction.Railway Turning and Transfer Tables,
SHAFTING & MILL GEARING, a specialty.

Pivot Bridges.

GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.

A. M. SWAIN, MECHANIST,

North Chelmsford, Middlesex County, Mass.,

Attends Personally to the Improvement of

WATER POWER
AND

MACHINERY.

TURBINE WHEELS,

And a large variety of other Machinery Manufactured in Wood and Metal.
Power Weighed, Water Measured, and Plans and Specifications prepared.

REFERS BY PERMISSION TO

James B. Francis, C. E.,
Engineer of Lowell Co., Lowell, Mass.George Richardson,
Supt. Lowell Machine Shop, Lowell, Mass.Charles L. Hiddereth,
Foreman Lowell Machine Shop, Lowell, Mass.A. J. Hiscor,
Prest. Hiscox Pipe Mfg. Co., Lowell, Mass.John Rhodes,
Warp Manufacturer, Millbury, Mass.Hiram F. Mills, C. E.,
Engineer Essex Co., Lawrence, Mass.James Kendall, M. E.,
South Framingham, Mass.James Emerson,
Dynamical Engineer, Holyoke, Mass.Hotop Paper Co.,
Paper Manufacturers, Holyoke, Mass.Chas. S. Bliven,
Wilmantte, Conn.

THE AMERICAN DREDGING CO.

BUILDERS OF STEAM DREDGING MACHINES,
GUNPOWDER PILE-DRIVERS, &c.

CONTRACTORS FOR

IMPROVING RIVERS AND HARBORS,
EXCAVATING CANALS,
RECLAIMING AND FILLING LOW LANDS,
PILEING FOR FOUNDATIONS, PIERS, ETC.

Offices, No. 10 South Delaware Ave., Philad'l'a.

Steam Pumping Machinery

OF EVERY DESCRIPTION.

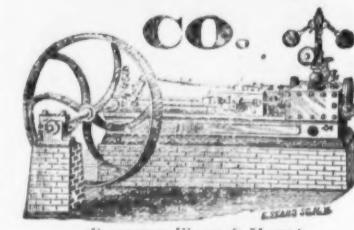
PHILADELPHIA HYDRAULIC WORKS, Cor. Evelina & Levant Sts., PHILA.

Send for Descriptive Price List.

Machinery, &c.

UTICA

Steam Engine

(FORMERLY WOOD & MANN)
STATIONARY & PORTABLE
STEAM ENGINESThe best and most complete Assortment in
the Market.These Engines have always maintained the very highest
standard of excellence. We make the manufacture of
Engines our business, and we have a stock of them. We have
the largest and most complete works in the country,
with machinery specially adapted to the work.We keep constantly in process large numbers of Engines,
which we furnish at the very lowest prices.We have a large number of Engines, which we have
adapted to Mines, Saw Mills, Grist Mills, Tanneries, Cotton
Gins, Threshers and all classes of manufacturing.We are now building the celebrated Lane Circular Saw
Mills, which are the largest and most powerful ever invented.We make the manufacture of saw Mill Outfits a
special feature of our business, and can furnish complete
outfits on the shortest notice.Our claim to be is, to furnish the best machinery
in the market, and work absolutely unequalled for de-
sign, economy and strength.

Send for Circular and Price List.

UTICA STEAM ENGINE CO.,
UTICA, N. Y.

LATHES, PLANERS,

and other

Machinists' Tools.

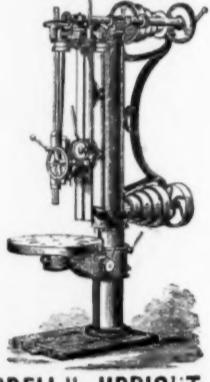
For Sale by

New Haven Mfg. Co.,

NEW HAVEN, CONN.

P. BLAISDELL & CO.,
WORCESTER, MASS.,

Manufacturers of the

"BLAISDELL" UPRIGHT DRILLS,
And other First-Class Machinists' Tools.JOHNSON'S PATENT UNIVERSAL
LATHE CHUCK.

We invite attention to the superior construction of this chuck. Its working parts are absolutely protected from dirt and chips. It is strong, compact and durable, and will hold the greatest variety of work, as the jaw are adjustable with a range of full diameter.

For Price List address, Lambertville Iron Works, Lambertville, N. J.

LIST OF HARDWARE DEALERS.

Having compiled a complete list of the Hardware
Dealers in the United States, expressly for addressing
Circulars, I am prepared to receive orders for ad-
dressing Circulars. The name of the dealer whose Circular
is to be addressed is cut from the list and stamped upon the
envelope or wrapper, thus enabling me to address a
great number in a short space of time, and at rates far
below the price usually paid for addressing Circulars
at post offices, and can be done for one-third the expense of
addressing by hand. My list contains names of over 4000
dealers, each State, city and town therein, being com-
piled separately. I should be glad to receive any
information which may be necessary to have it
published in these Circulars, and will be happy to send out
Circulars, price lists, &c., to the trade throughout the States.
cannot fail to find my list and style of addressing
a great advantage to them. It has been tried by
a large number in the trade, some of whose names appear
at the bottom of this Circular, and to any of whom I
would most respectfully refer. Circulars may be addressed
to **THOMAS H. SMITH**, 11 Broad St., N. Y.,
and my list will be forwarded to any address
in the U. S. upon receipt of \$1.00.

THOMAS H. SMITH, 11 Broad St., N. Y.

REFERENCES.

Union Nut Co., 78 Beckman St., L. Boardman & Son, 34
Chambers St., Miller's Fife Co., 35 Beckman St., E. M.
Benton & Co., Beckman St., Beckman & Co., 34
Chambers St., my list will be forwarded to any address
throughout the U. S. upon receipt of \$1.00.
NEW YORK, February 15, 1875.

TUBAL SMELTING WORKS,
760 South Broad Street, PHILADELPHIA.
PAUL S. REEVES,
MANUFACTURER OF
ANTI-FRICTION METALS
OF VARIOUS GRADES.

XXX Metal Nickel Iron50 cts. per lb	B These metals are alloys of lead, with various percentages of tin, antimony and copper, according to price.
XX Metal Nickel Hardening45 cts. per lb	F Those metals are the ordinary low priced Babbitt alloys, used where there is not much wear on the machinery, and where economy is required.
X Metal Copper Hardening40 cts. per lb	G 90 cts. 18 cts. 16 cts.
A " " " 35 cts. per lb	H 14 cts. 12 cts.
B " " " 30 cts. per lb	
C " " " 25 cts. per lb	

BRASS CASTINGS,
21 to 35c per lb.
INGOT BRASS,
19 to 30c per lb.
**BRASS TURNINGS AND OLD
METALS WANTED.**

Plumb, Burdick & Barnard,

BUFFALO, N. Y.

MANUFACTURERS OF

BOLTS

COACH SCREWS,

SKEIN BOLTS,

CARRIAGE BOLTS,

TIRE, SLEIGH SHOE,

Machine and Blank Bolts.

FERNALD & SISE, N. Y. Agents, 100 Chambers St.

ESTABLISHED 1842.

WM. & HARVEY ROWLAND,
PHILADELPHIA.

P. O. Address: Frankford, Philad'l'a. MANUFACTURERS OF ALL KINDS OF

Elliptic, Platform AND C Springs,
MADE EXCLUSIVELY FROM
SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.
CAST SHOVEL, HOE AND MACHINERY STEEL.

BESSEMER TOE, SLEIGH AND TIRE STEEL.
BESSEMER SHOVEL AND PLOW STEEL.
BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

SUCCESS
BEYOND COMPETITION.
Nellis' Patent Cotton Tie.

This Tie meets the approval of every Planter and Factor that has given it a trial. A single trial at the Press or Compress affirms its strength, merits and advantages over all the others. We are prepared to supply the trade at market prices. Orders and sample Orders respectfully solicited.

Nellis' Process for Tempering Steel,
Which we use in the manufacture of Moldboards, Walking and Riding Cultivator Shovel, Oval and Flat Saws, Scythes, Hoes, Spades, Forks, Hoes, &c., in fact, everything in the Agricultural steel that is ploughed, forged and finish to suit all kinds of soil. Implement makers and Farmers can govern themselves by the sections of the imprint thereon of our Trade Mark.

Also Manufacturers of Nellis' Original Harpoon Horse Hay Fork, Nellis' Graphite and Pulleys and Hart's Post Anger. Your wants in our lines will receive prompt attention by addressing

A. J. NELLIS & CO.,
Pittsburgh, Pa.

ESTABLISHED 1840.

R. E. DIETZ,

No. 54 & 56 Fulton, and
29 & 31 Cliff Street, New York.

Manufacturer of the



Each mouse caught resets the Trap for another.

TUBULAR

And Other

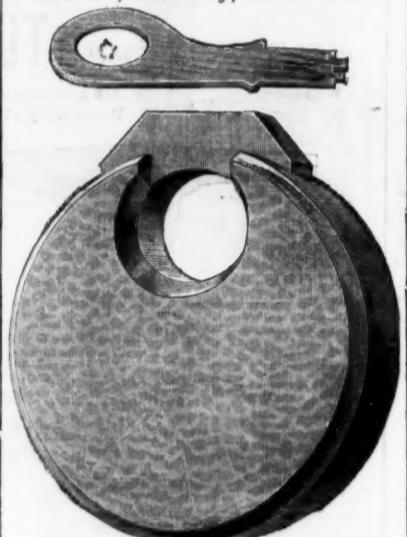
Patent Lanterns

BRASS AND IRON

Jack Chains.

D. H. MILLER LOCK CO.,
712 Cherry St., Philadelphia, Pa.

Securit', Durability, Convenience.



IMPROVED SELF-LOCKING
Brass Pad Locks.
Made in the most substantial and compact manner, and are in every respect a superior article. We guarantee that no two locks are alike, unless specially ordered. Each lock furnished with two keys. Any number of locks can be supplied, and ordered separately. United States Government. Samples of No. 1 Lock sent to all parts free, on receipt of \$1.75. Liberal Discounts to the Trade.

GAS FIXTURES.

Lamps, Bronzes,
Equal to any made, in great variety,
all of our own manufacture.

BRADLEY & HUBBARD MFG. CO.,
SALESROOMS:
21 & 23 Barclay, cor. Church St.,
NEW YORK.

KEUFFEL & ESSER,

Importers and manufacturers of
MATHEMATICAL INSTRUMENTS,
Hard-rubber Tools, Drawing Papers, Scales,
T Squares, Tapes, Chains, Colors, Etc.
Send 10 cents for illustrated catalogue.

111 Fulton Street, New York.

READ & DICKEY,

Cleveland, O.,
BROKERS IN

IRON.

Pig, Bar, Band, Hoop, Plate,
Sheet, Skelp, Nails, &c.

Established 1827.

Oldest House in the Plumbago Trade.

46 Prizes since 1839
for our Black
Lead Manufactures.

DIXON'S

Silver Medal
Paris Exposition,
1867.

Plumbago
"PERFECT LUBRICATOR,"

Being Finely Pulverized and absolutely Pure
AMERICAN GRAPHITE.

A Sure Preventive of, and Cure for, Hot Journals or Heated Bearings of any kind.

WILL SAVE WEAR, DELAYS, TIME AND MONEY.

It is not a compound or mixture, but Pure Graphite, of wonderful and unique properties, free from grit, a perfect conductor; not touched by acids, or changed by fire or frost.

Safe, Economical, Indestructible.

Known as the best Lubricator 200 years ago, but nobody has been heretofore prepared to furnish it in perfectly pure state to the trade. **FIFTY CENTS PER POUND.**

The Joseph Dixon Crucible Company,
ORESTES CLEVELAND, President, Jersey City, N. J.
Works and Offices, 233, 235, 237, 239, 241 and 243 RAILROAD AVENUE;
250, 252, 254 and 256 WAYNE STREET.

Russell, Burdsall & Ward,
PORT CHESTER, N. Y.

Manufacturers of

**Carriage, Tire, Plow, Stove,
AND OTHER**

BOLTS.

Carriage Bolts made from Best Square Iron, a Specialty.

THE "GEM" DOOR SPRING,

Made of Best Quality of Steel and of Superior Temper.

An

Made for

easily

Service.

adjusted,

Reliable,

powerful

Satisfactory

and

and

effective

Low in Price.

Spring.

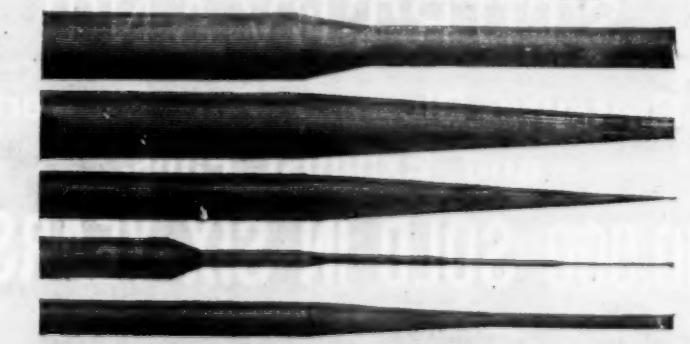
See quotations.

MANUFACTURED BY

VAN WAGONER & WILLIAMS, 82 Beekman St., N. Y.
Please note removal.

The MALTBY, HOPSON & BROOKS MFG. CO., Waterbury, Conn.

Manufacturers of **HOPSON & BROOKS' Patent Made**



POLISHED STEEL DRILL RODS.

Straight Polished Steel, Iron & Brass Wire Cut to any Length & Exact Size.

Tapered Articles from either Round or Square Wire any shape or size. Also, Capewell's Giant Nail Puller.